

6364

G-000-903 .1

## NATURAL RESOURCE MANAGEMENT PLAN

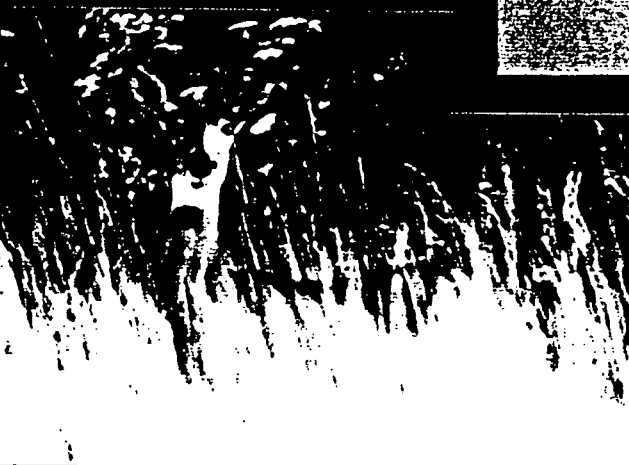
07/01/94

NRT            PUBLIC  
30  
MGT PLAN

**FERNALD**

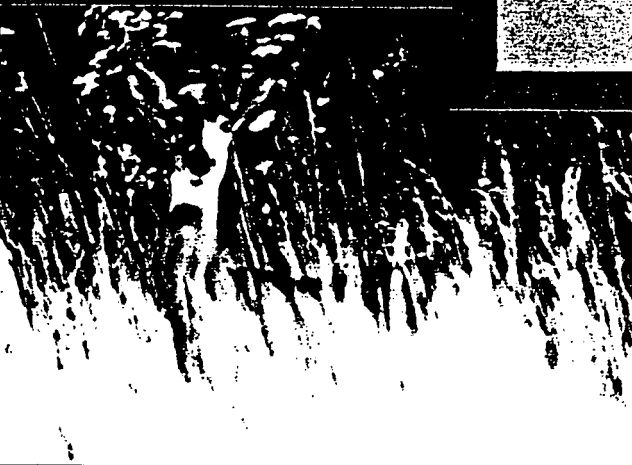
Environmental Management Project

# ***NATURAL RESOURCE MANAGEMENT PLAN***





# ***NATURAL RESOURCE MANAGEMENT PLAN***



## ***Front Cover Photos***

**Multiflora Rose**  
**(*Rosa multiflora*)**

**Eastern Box Turtle**  
**(*Terrapene carolina*)**

**Eastern Blue Bird**  
**(*Sialia sialis*)**

**White-Tailed Deer**  
**(*Odocoileus virginianus*)**  
**Standing Amongst Goldenrod**  
**(*Solidago sp.*)**

**Male Cone of**  
**White Pine**  
**(*Pinus strobus*)**

**NATURAL RESOURCE MANAGEMENT PLAN**

**DRAFT**

**FERNALD ENVIRONMENTAL  
MANAGEMENT PROJECT**

(NOTE: Information in this document is current up to June 1, 1994)

**JULY 1994**

**U.S. DEPARTMENT OF ENERGY  
FERNALD FIELD OFFICE**

**000004**

{This page left blank intentionally}

## TABLE OF CONTENTS

	<u>Page</u>
List of Figures and Tables	iii
List of Acronyms and Abbreviations	v
1.0 Natural Resource Management Plan Introduction	1-1
2.0 Wetlands	2-1
3.0 Wildlife Habitats	3-1
4.0 Threatened and Endangered Species	4-1
5.0 Cultural Resources	5-1
6.0 Floodplains	6-1
7.0 Soil, Air, and Water Resources	7-1
8.0 Conclusion	8-1
9.0 List of Contributors	9-1
10.0 References	10-1
Appendix A - Photographs of FEMP Natural Resources	A-1

{This page left blank intentionally}



## LIST OF FIGURES AND TABLES

		<u>Page</u>
Figure 1-1	FEMP Facility Location Map	1- 9
Figure 2-1	Jurisdictional Wetlands at the FEMP Site	2- 5
Figure 3-1	Terrestrial and Aquatic Habitats at the FEMP Site	3- 3
Figure 6-1	Floodplain Regulations	6- 2
Figure 6-2	Floodplain Regulations Flowchart	6- 3
Figure 6-3	Paddys Run 100- and 500-Year Floodplain Boundary Map	6- 7
Figure 6-4	Great Miami River 100- and 500-Year Floodplain Boundary Map	6- 9
Figure 7-1	Prime Agricultural Soils	7- 5
Figure 7-2	Regional Surface Waters	7-11
Table 7-1	Soil Series, Slopes, and Prime Farmland Soil Classification	7- 7

{This page left blank intentionally}

## LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
C.F.R.	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
CRC	Cultural Resources Coordinator
CRMP	Cultural Resources Management Plan
CRU	CERCLA/RCRA Unit
CWA	Clean Water Act of 1987
DOE	U.S. Department of Energy
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
FMPC	Feed Materials Production Center
FONSI	Finding of No Significant Impact
ft	feet
ha	hectares
IP	Individual Permit
km	kilometers
mi	miles
NRM	Natural Resource Management (Department)
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NCP	National Contingency Plan
NEPA	National Environmental Policy Act of 1969

NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NOI	Notice of Involvement
NPDWS	National Primary Drinking Water Standards
NRDA	Natural Resource Damage Assessment
NRMP	Natural Resource Management Plan
NSPS	New Source Performance Standards
NWP	Nationwide Permit
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RM	river mile
ROD	Record of Decision
SARA	Superfund Amendments Reauthorization Act of 1986
SHPO	State Historical Preservation Office
SSOD	Storm Sewer Outfall Ditch
USC	U.S. Code
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WQC	Water Quality Certification

### Acknowledgements

The authors of the Natural Resource Management Plan would like to thank Mr. Jason Vineyard for his drawings of the Indiana bat and cave salamander. Jason is a Junior at Northwest High School in Cincinnati, Ohio. We would also like to thank Mr. Jeff Davis, a biology teacher at Northwest High School, for introducing us to Jason.

The Natural Resource Management Plan also utilized illustrations from the following source and recognizes the respective author's and/or publisher's copyrights to those illustrations:

- Britton, N.L. and A. Brown, 1936, Illustrated Flora of the Northern United States, Canada, and the British Possessions from Newfoundland to the Parallel of the Southern Boundary of Virginia and from the Atlantic Ocean, Westward to the 102nd Meridian, 2nd edition revised, Volumes I-III, New York, Botanical Garden, NY.

{This page left blank intentionally}

## 1.0 NATURAL RESOURCE MANAGEMENT PLAN INTRODUCTION

### 1.1 Authority and Scope

The United States Department of Energy (DOE) and the Fernald Environmental Restoration Management Corporation (FERMCO) recognize environmental protection and the management of natural resources as part of the site mission at the Fernald Environmental Management Project (FEMP). The implementation of this Natural Resource Management Plan (NRMP) is a significant step towards effective management and protection of natural resources at the FEMP site. In addition, the plan promotes the overall mission of FERMCO (i.e., to achieve "safe, least-cost, earliest, final clean-up of the Fernald site, within applicable DOE orders, regulations and commitments...") and is consistent with the objectives and goals of DOE for management of the FEMP.

Authority and direction for the NRMP are derived from several sources: DOE Order 5400.1, "General Environmental Protection Program"; DOE Order 4300.1C, "Real Property Management"; and the National Environment Policy Act (NEPA). These guidelines establish the need for the DOE to actively monitor and manage the natural resources at their sites and maintain them in a healthy condition. In addition, there are numerous other resource-specific regulations (e.g., The Endangered Species Act and The National Historic Preservation Act) which require specific management activities including updating inventories of species and mitigating environmental impacts of major projects as necessary. This plan is a tool to facilitate compliance with applicable DOE Orders, ongoing regulatory programs at the site (such as NEPA), and the numerous natural resource-specific regulations.

This NRMP outlines specific management practices that have been identified in the compliance requirements of the regulations governing the particular natural resource. Natural resource management at DOE facilities is carried out to ensure that the sites comply with all applicable laws and regulations for specific natural resources, that they derive maximum benefits from existing natural resources on DOE controlled land, and that they effectively conserve suitable areas of DOE land.

Since production operations were halted in 1989, the mission of the FEMP has been directed towards environmental restoration with the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments Reauthorization Act of 1986 (SARA), jointly referred to herein as "CERCLA". The FEMP is currently involved in the Remedial Investigation/Feasibility Study (RI/FS) process for each of the five operable units that have been identified at the site.

Although the management of natural resources will be integrated with the CERCLA response actions at the site to the extent practicable, it will be subordinate to the requirements of CERCLA response actions. However, every effort will be made to integrate NRMP strategies into CERCLA, NEPA, and Natural Resource Trusteeship activities whenever practicable.

## 1.2 Implementation and Integration With Ongoing Regulatory Programs

The implementation of the NRMP is the responsibility of FERMCO's Natural Resource Management (NRM) Department. The NRM Department will work with each of the five CERCLA/RCRA Units (CRUs) within FERMCO as well as other appropriate groups to ensure that implementation of this plan occurs in the most effective manner possible. The NRM Department will conduct or oversee the appropriate field surveys and recommend the appropriate avoidance (e.g., siting a facility away from wetland areas), minimization (e.g., limiting vehicle traffic through sensitive areas), and mitigative measures (e.g., compensating for the loss of an endangered species) as identified in this plan to CRU and/or project personnel. In cases where impact minimization or mitigation activities are required, coordination with the CRUs will occur to ensure that the appropriate measures are carried out in the field. Mitigation will be considered only in extreme cases (e.g., loss of wetland or endangered species habitats) as determined through consultation with the appropriate regulatory agency(ies). Furthermore, it is expected that activities resulting from the implementation of this plan will primarily be avoidance/minimization activities. The NRMP will be a living document, which will be reviewed a minimum of every two years and revised as appropriate.

The management of natural resources by DOE will be an ongoing process at the FEMP as long as the federal government retains ownership of the property. The overall strategy includes: establishing and



maintaining a characterization of natural resources at the site; developing and implementing this plan; recommending avoidance/mitigation measures; monitoring the condition of the resources; and ensuring that actions taken protect or enhance natural resources.

The laws and regulations driving activities at the FEMP will play an important role in implementing the NRMP. It is essential that effective integration of the NRMP's management strategies with remedial or other regulatory activities (e.g., Resource Conservation Recovery Act) required by these laws and regulations is established. Understanding these relationships will ensure that effective strategies for implementing the site's NRMP can be carried out.

CERCLA: The RI/FS process under CERCLA is currently ongoing at the FEMP site. Protection of natural resources is part of the CERCLA evaluation criteria. However, in accordance with the missions of FERMCO and DOE, protection of public health shall be a primary consideration along with the protection of natural resources at the FEMP site. Natural resource impact minimization and avoidance should and will be considered during the RI/FS and design phases of the CERCLA response actions; however, they may not be the deciding factor in how an area is cleaned up. Remediation for protectiveness of human health and environment will be the first priority and the avoidance or mitigation of impacts to natural resources during remediation will be considered as appropriate.

The CERCLA implementing regulations, 40 Code of Federal Regulations (C.F.R.) Part 300 (1992), require that final remediation levels establish acceptable exposure levels that are protective of human health and the environment. These levels shall be developed by considering: §300.430(e)(i)(A), Applicable or Relevant and Appropriate Requirements (ARARs) under federal environmental or state environmental or facility siting laws and §300.430(e)(i)(G) "environmental evaluations that assess threats to the environment, especially sensitive habitats and critical habitats of species protected under the Endangered Species Act."

This NRMP will function as a reference document during development of the site NEPA documents (e.g., the RI/FS-NEPA documents for the operable unit remedial design/remedial action work plans). This plan is designed to provide an up-to-date characterization of FEMP natural resources and serve as a guideline on natural resources management (in this case, the avoidance and mitigation of impacts) at the FEMP site.

NEPA: The National Environmental Policy Act is the basic national charter for protection of the environment. NEPA declares a national environmental policy and ensures that all federal agencies (including DOE) consider environmental impacts in the planning and decision-making phases of their projects. As such, NEPA is a regulatory driver for each of the natural resources discussed within the text of this document. This includes potential impacts to wetlands, endangered species, cultural resources, etc., that may occur as the result of a proposed action.

As part of the overall management of natural resources at the FEMP site, projects that undergo NEPA evaluations (e.g., RI/FS - NEPA evaluations) will refer to this plan for impact avoidance/minimization/mitigation guidance and will be monitored (i.e., surveyed in the field) during implementation and upon project completion. Field surveillances will ensure that natural resource management activities discussed in the respective NEPA documentation are being effectively implemented. In addition, field surveillances will identify areas that were not evaluated as part of a NEPA evaluation but may require additional management activities. Furthermore, routine field surveillances will also ensure that inventories of natural resources (e.g., listings or locations of threatened and endangered species) are kept current so that accurate impact analysis can be addressed in the NEPA documentation being prepared for site activities.

Natural Resource Trustees: A natural resource trustee is a federal or state appointee who acts on behalf of the public as a guardian for natural resources.<sup>1</sup> CERCLA §101(16) defines a natural resource as "land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States . . . , any State, or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction on alienation, any member of an Indian tribe."<sup>2</sup>

---

<sup>1</sup> 43 C.F.R. §11.14(rr) defines Natural Resource Trustee as "any Federal natural resources management agency designated in the NCP and any State agency designated by the Governor of each State, pursuant to section 107(f)(2)(B) of CERCLA; or an Indian tribe, that may commence an action under section 126(d) of CERCLA".

<sup>2</sup> See also 43 C.F.R. §11.14(z).

The potential Trustees for the Fernald site include DOE, U.S. Department of Interior (this includes U.S. Fish and Wildlife Service), and the State of Ohio [the Ohio Environmental Protection Agency (EPA) has been selected as the State's representative].

As of July 1994, there has been one introductory meeting of the Fernald site Natural Resource Trustees. The meeting was held in June 1994 for the Trustees to meet and begin determining how they wanted to work together in the future. The Trustees agreed to meet further and examine ways of integrating the natural resource concerns into the RI/FS and the remedial design/remedial action processes.

The exact role of the Natural Resource Trustee is not clearly defined in the requirements. However, natural resource trusteeship can include but does not require a formal process to assess monetary damages on responsible parties for injuries to natural resources that have not been and are not expected to be addressed by response actions. The Fernald Trustees have not decided whether or not to pursue this formal process.

Two criteria of the CERCLA remedy selection process are state and public acceptance. These criteria can be coordinated with the Natural Resource Trustee efforts at the site. While the public is not a Trustee, they do have a voice through the state and other Trustees. A public workshop discussing Natural Resource Trusteeship was held in April 1994 and the Trustees have committed to keeping the public informed of Trustee activities. Thus, the end result of this coordinated effort is to achieve response actions that meet the primary goal of remediation while considering the natural resource concerns of the Trustees.

The NRMP will be a good educational tool to share with the Natural Resource Trustees since the NRMP is a "living document" and will contain the latest information on natural resources at the site. In addition, this NRMP will demonstrate that there are diverse natural resources on the FEMP site and that DOE is taking steps to protect them.

### 1.3 Organization of NRMP

The following provides a brief overview of the organization of the NRMP.

- Chapter 1.0 provides a brief overview of the purpose of the plan and responsibilities associated with the plan. In addition, it provides an overview of the natural resources at the FEMP site.
- Chapters 2.0 through 7.0 devote a chapter to each of the major categories of natural resources that will be managed at the FEMP site. Each chapter provides a discussion of the regulatory drivers applicable to the management of the particular natural resource, a detailed description of the natural resource, overall management objective(s) pertaining to the respective natural resource, and the specific management plan to be implemented to meet the management objective(s).
- Chapter 8.0 provides a conclusion.
- Chapter 9.0 provides a list of contributors to the NRMP.
- Chapter 10.0 provides references.
- Appendix A contains selected photographs and drawings of the various natural resources at the FEMP site.

### 1.4 General Description of FEMP Site

This discussion provides a brief overview of the FEMP's natural resources and setting. More detailed information on specific natural resources can be found in Chapters 2.0 through 7.0.

The FEMP, formerly known as the Feed Materials Production Center (FMPC), is a 425-hectare (ha) (1050-acre), government-owned facility located in southwestern Ohio, about 29 kilometers (km) [18 miles

(mi)] northwest of downtown Cincinnati, Ohio. The facility is located just north of Fernald, Ohio, and lies on the boundary of Hamilton and Butler counties (Figure 1-1). Approximately 345 ha (850 acres) of the FEMP property are in Crosby Township of Hamilton County, and 80 ha (200 acres) are in Ross and Morgan townships of Butler County.

The FEMP operated from 1951 to 1989 providing high purity uranium metal products to support the United States defense programs. Production operations were halted in 1989 and the DOE redirected its efforts from defense programs to environmental restoration/waste management.

Southwestern Ohio lies within the Till Plains region of the Central Lowland Physiographic Province. This area is characterized by gently to steeply rolling hills, which were formed as a result of several periods of glaciation. The topography of the area ranges from approximately 500 feet above mean sea level (MSL) along the Ohio River to almost 900 above feet MSL on the hilltops (DOE 1993).

In the vicinity of the FEMP, the hilly topography is separated by broad, flat areas that compose the floodplains of the larger surface water features. Some of the prominent flat areas in the vicinity of the FEMP include the floodplains of the Great Miami River and the floodplains of the Whitewater River and Dry Fork Creek southwest of the FEMP (DOE 1993).

The principal water resource within the region of the FEMP is the Great Miami Aquifer, which has been designated as a sole-source aquifer under the provisions of the Safe Drinking Water Act. Principal sources of recharge for the Great Miami Aquifer include direct precipitation and natural and induced stream infiltration.

In the vicinity of the FEMP, three surface water features predominate. These include the Great Miami River, Paddys Run, and a tributary to Paddys Run referred to as the Storm Sewer Outfall Ditch (SSOD). Paddys Run parallels the western property boundary and flows south into the Great Miami River. The SSOD is located in the south central portion of the FEMP and feed into Paddys Run. The Great Miami River flows just east of the FEMP and exhibits meandering patterns that result in sharp directional changes.

{This page left blank intentionally}

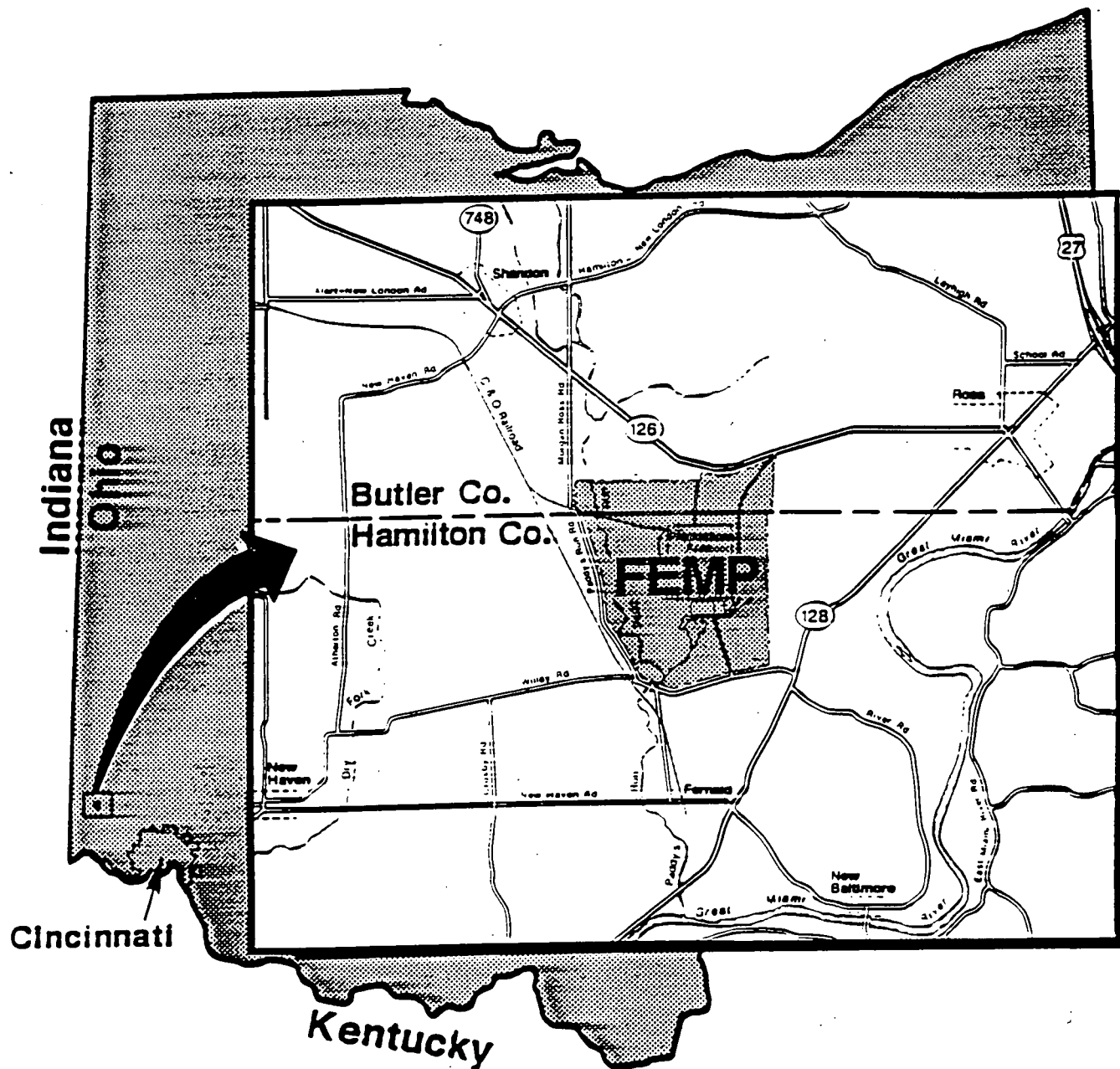


FIGURE 1-1. FEMP FACILITY LOCATION MAP

{This page left blank intentionally}



The FEMP and surrounding areas lie in a transition zone between two distinct sections of the Eastern Deciduous Forest Province as described by Bailey (1978): the Oak-Hickory and the Beech-Maple forests. The region is characterized by the presence of a mosaic of these forest types. The Oak-Hickory and Beech-Maple forest sections share many characteristics (e.g., white oak) as a common species.

Terrestrial ecological communities on the FEMP property consist of grazed and ungrazed pastures, two pine plantations, deciduous woodlands, riparian woodland, and the "reclaimed flyash pile area," also known as the Inactive Flyash Pile. The reclaimed flyash pile area coincides with the South Field and the Inactive Flyash Pile and was considered a distinct habitat by Facemire *et al.*, (1990) because of its status as a early successional woodlands. A total of 47 species of trees and shrubs, 190 species of herbaceous plants, 20 mammal species, 98 bird species, 10 species of amphibians and reptiles, 21 species of fish, 47 families of benthic macroinvertebrates, and 132 families of terrestrial invertebrates were catalogued at the FEMP by Facemire. Additional information on ecological communities at the FEMP can be found in Chapter 3.0.

Several threatened or endangered species (state and/or federally listed) have the potential to occur on the FEMP property. The Indiana bat, running buffalo clover, cave salamander, and spring coralroot are threatened and endangered species that have the potential to occur on the FEMP property due to favorable habitat but have not actually been found residing on the property. Slender fingergrass and mountain bindweed are both state-listed endangered species that have been reported on property by Facemire *et al.*, (1990). Several threatened or endangered migratory birds were sited on the FEMP during the Facemire study but are not actually residing on the property. These include the norther harrier, northern waterthrush, and dark-eyed junco. A recent survey for the Sloan's crayfish has located individuals of this state-listed threatened species residing in Paddys Run. Additional detail on the Sloan's crayfish and other threatened and endangered species can be found in Chapter 4.0.

Floodplains within the FEMP property are confined to the north-south corridor containing Paddys Run. Outside the boundaries of the FEMP, the 100- and 500-year floodplain of the Great Miami River extends west of Big Bend to an elevation near the eastern boundary of the facility. The 100- and 500-year

floodplain of the river also extends northward along Paddys Run from the point where the two streams join (or confluence of the two streams) to a point north of the northern boundary of the FEMP.

A study by PARSONS (1993) examined the 100- and 500-year floodplain along with Paddys Run. The results of this study predicted a 100 year flood flow of approximately 11,150 cubic ft per second. Elevations range from 542 ft MSL at the southern boundary of the floodplain to 567 MSL at the northern tip.

A site-wide wetlands delineation was conducted in January 1993 in accordance with the 1987 Army Corps of Engineers Wetlands Delineation Manual and was approved on August 12, 1993 by the COE. The purpose of the delineation was to determine the extent of Jurisdictional Wetlands and Waters of the United States at the FEMP. The delineation was only to identify locations of wetlands. The FEMP uses this information to prevent insult to wetlands. Results from the site-wide delineation indicate a total of 14.5 ha (35.9 acres) of jurisdictional wetlands on the FEMP property. Chapter 2.0 contains additional information on wetlands.

## 2.0 WETLANDS MANAGEMENT

### 2.1 Regulatory Drivers

10 C.F.R. Part 1022: The DOE has established 10 C.F.R. §1022, "Floodplain/Wetland Environmental Review Requirements" for compliance with Executive Order 11990 - "Protection of Wetlands," which requires all federal agencies to issue procedures to consider wetlands protection in decision making. The regulations are applicable to all organizational units of DOE except the Federal Energy Regulatory Commission and are designed to be coordinated with the environmental review requirements established pursuant to NEPA. Actions impacting wetlands require the performance of a wetlands assessment and publication of a Wetlands Notice of Involvement in the Federal Register to satisfy public notice requirements of 10 C.F.R. §1022.14. The assessment must evaluate short- and long- term effects, alternatives, and mitigation measures.

33 C.F.R. Parts 323-330: In 1972, the Federal Water Pollution Control Act, now commonly referred to as the Clean Water Act was passed. This act established the control of widespread pollution of many United States rivers and streams. Pursuant to Section 404 of the Clean Water Act, anyone (including private citizens and federal, state, and local agencies) who wishes to discharge dredged or fill material into waters of the United States, including wetlands, must obtain permit authorization by the COE. The COE utilizes two types of permits to authorize these activities, Nationwide Permits (NWP) and Individual Permits (IPs).

NWPs are promulgated in Appendix A to 33 C.F.R. Part 330 and are designed to authorize certain predefined types/categories of activities (i.e., stream crossings, new outfall structures, minor discharges, etc.). NWPs are desirable for authorizing dredge and fill activities due to the short processing time (approximately 30 days) and minimal amount of administrative permit preparation by both applicant and the COE. When NWPs are not deemed applicable for authorizing an activity or the COE feels the activity will result in a substantial impact to the environment, an IP will be required to authorize a proposed project. IPs generally require a longer processing time (approximately four months) and require more permit preparation.

In addition to the Section 404 permitting requirements, Section 404 permit applicants are also required to obtain Section 401 State Water Quality Certification (WQC) for dredge and fill projects. In Ohio, the 401 WQC process is administered by Ohio EPA pursuant to Chapter 3745-32 of the Ohio Administrative Code (OAC).

Given the CERCLA status of the FEMP, the Sections 404 and 401 permitting processes can become complicated. Pursuant to CERCLA Section 121(e), the National Contingency Plan (NCP) (40 C.F.R. §300.400) (1992), and Paragraph XIII (A) of the Amended Consent Agreement signed by DOE and U.S. Environmental Protection Agency (EPA), CERCLA removal/remedial actions are exempt from the requirements to obtain formal permit approval; however, the FEMP is still required to address any substantive requirements that would have been imposed during the permit process for a project.

For Sections 404 and 401 permits/certifications, these substantive requirements would include avoidance and minimization of wetland impacts, compliance with conditions of the NWPs or the Section 404(b)(1) Guidelines promulgated in 40 C.F.R. Part 230.10, and mitigation of wetland impacts. In accordance with Paragraph XIII(B) of the Amended Consent Agreement, the FEMP is required to address these substantive requirements within the context of a CERCLA permit information summary, submitted to both EPA and Ohio EPA officials for review and comment. For CERCLA projects, EPA assumes a lead role in assessing dredge and fill activity impacts, while the COE serves as technical advisor to EPA.

Those FEMP projects which do not qualify for the CERCLA permit exemption such as non-CERCLA activities will be required to undergo the full Sections 404 and 401 permitting process.

## **2.2 Description of FEMP Wetlands**

A wetland delineation was conducted on the FEMP property during December 11-18, 1992 and January 7-16, 1993. Wetlands were delineated using the Routine On-site Methodology (Environmental Laboratory 1987). On-site waters of the United States were determined pursuant to 33 C.F.R. Part 328 (1991). The Wetlands Delineation Report was approved in August 1993 by the COE, Louisville District (Ebasco Environmental 1993).

A total of 14.5 ha (35.9 acres) of freshwater wetlands were delineated on the FEMP property. Delineated wetlands included 10.76 ha (26.58 acres) of palustrine forested wetlands, 2.8 ha (6.95 acres) of drainage ditches/swales, and 0.96 ha (2.37 acres) of isolated persistent emergent and scrub/shrub wetlands (Figure 2-1). A photograph of a wetland area on the FEMP property (along with selected examples of natural resources discussed in later chapters) can be found in Appendix A, page A-1.

Palustrine Forested Wetlands: A total of 10.76 ha (26.58 acres) of palustrine forested wetlands were delineated in the north central portion of the property. Poor drainage results in a water table either at or within one foot of the surface during spring and winter. Dominant vegetation consists of woody plants such as American elm (*Ulmus americana*) and Tartarian honeysuckle (*Lonicera tartarica*), with shrub layers consisting of roughleaf dogwood (*Cornus drummondii*) and multiflora rose (*Rosa multiflora*).

Drainage Ditches/Swales: Man-made drainage ditches and naturally occurring swales are located north and northwest of the former Production Area. Water tends to occur during or immediately after precipitation in the drainage ditches. On-property drainage ditches and swales support shrub and/or emergent vegetation. Broad-leaf cattail (*Typha latifolia*) is the most common species. Numerous woody species in shrub growth include black willow (*Salix nigra*), roughleaf dogwood, and American elm.

Isolated Wetlands: Isolated emergent and scrub/shrub-emergent wetlands are located along the northern property boundary just east of Paddys Run and near the northeast corner of the property. These wetlands are part of six major drainage systems on property. Dominant vegetation includes yellow nutgrass (*Cyperus esculentus*), soft-rush (*Juncus effusus*), Pennsylvanicum smartweed (*Polygonum pensylvanicum*), red fescue (*Festuca rubra*), and marsh marigold (*Caltha palustris*).

### 2.3 Management Objectives





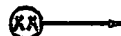
Impact Avoidance and Minimization: Wetlands on property will be managed in accordance with 40 C.F.R. Part 1508.20 (1992) and 10 C.F.R. §1022, which encourage avoidance and minimization of wetland impacts from CERCLA and non-CERCLA activities. All activities conducted at the FEMP will be planned, implemented, and monitored to avoid impacts to wetlands to the extent practicable.

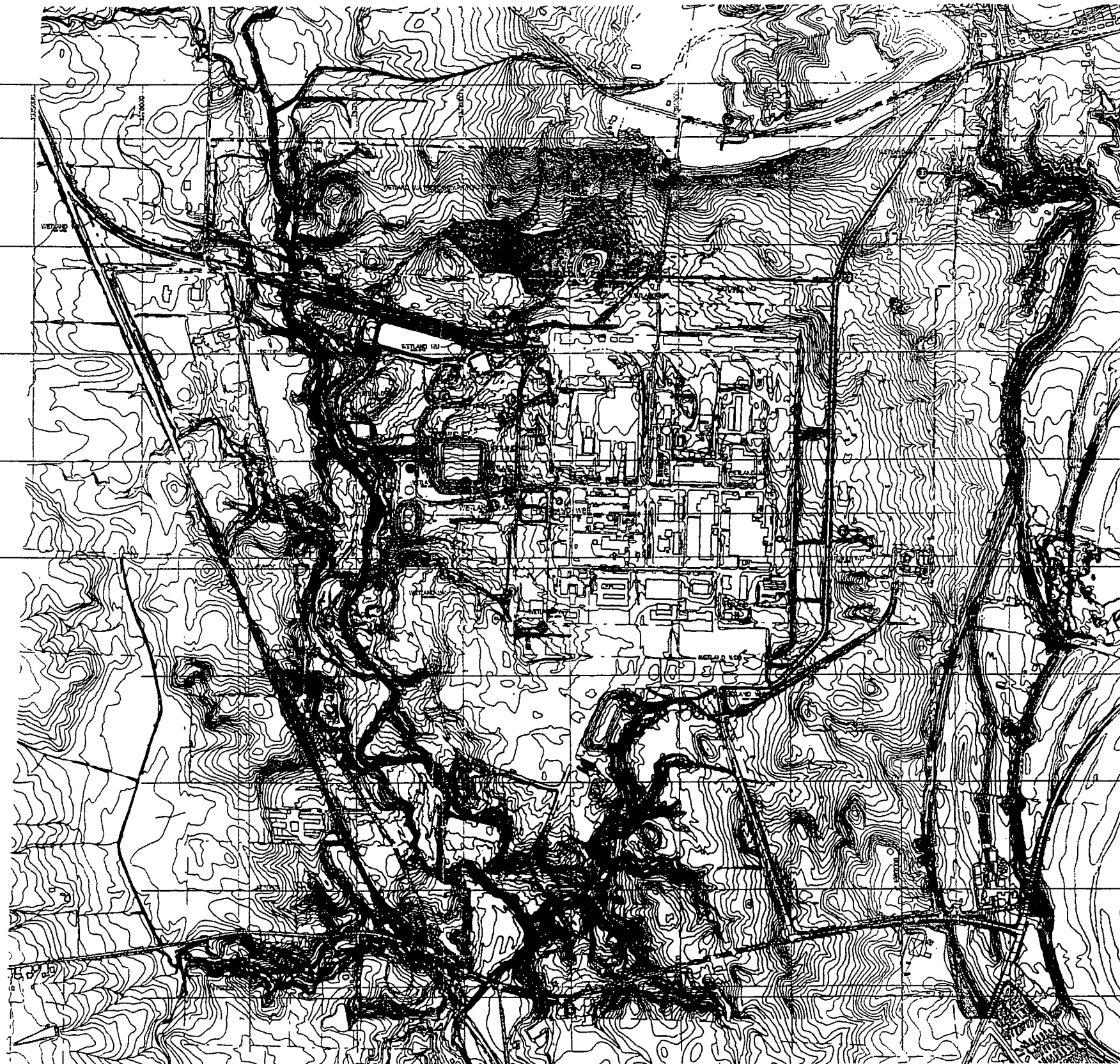
{This page left blank intentionally}



0 100 500 1000

# LEGEND:

- WETLAND AREA 
- WATERS OF THE U.S. 
- SITE BOUNDARY 
- COUNTY LINE 
- PHOTO LOCATION 



<p>NOTE: FERMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY</p>				<p>APPROVALS</p> <table border="1"> <tr> <td>CIVIL &amp; STR.</td> <td>SAFETY ENG.</td> <td>MAINTENANCE</td> </tr> <tr> <td>ELECTRICAL</td> <td>ENV. PROT.</td> <td>WASTE MGMT.</td> </tr> <tr> <td>ENGINEER</td> <td>SECURITY</td> <td>CRUI</td> </tr> <tr> <td>INSTRUMENT</td> <td></td> <td></td> </tr> <tr> <td>MECHANICAL</td> <td></td> <td></td> </tr> </table>				CIVIL & STR.	SAFETY ENG.	MAINTENANCE	ELECTRICAL	ENV. PROT.	WASTE MGMT.	ENGINEER	SECURITY	CRUI	INSTRUMENT			MECHANICAL			<p><b>FERNALD ENVIRONMENTAL RESTORATION MANAGEMENT CORPORATION</b> Fernald Environmental Management Project <b>U.S. DEPARTMENT OF ENERGY</b></p>				<p>1993 JURISDICTIONAL WETLANDS &amp; WATERS OF THE U.S. FERNALD ENVIRONMENTAL MANAGEMENT PROJECT</p>			
CIVIL & STR.	SAFETY ENG.	MAINTENANCE																												
ELECTRICAL	ENV. PROT.	WASTE MGMT.																												
ENGINEER	SECURITY	CRUI																												
INSTRUMENT																														
MECHANICAL																														
<p>NO. REVISIONS DATE/DWN. BY/APPD. NO.</p>				<p>NO. REVISIONS DATE/DWN. BY/APPD. REF. DWG. NO.</p>				<p>FILE NAME: /RES/RES-254/75X000372.DGN</p>																						

{This page left blank intentionally}



Where avoidance is not practicable and appropriate, practical steps will be required to minimize adverse impacts to wetlands. Mitigation, as directed by the COE for non-CERCLA activities and EPA for CERCLA activities, will be performed only in cases when impacts can not be avoided in accordance with the 404(b)(1) guidelines of the Clean Water Act.

## 2.4 Management Plan

Wetland Delineation Update: To provide current wetland information, a wetland delineation update will be conducted every three years by the NRM Department. Methodologies will be performed in accordance with the most current COE and the EPA wetland delineation guidelines.

Wetland Delineation Map: The location and extent of jurisdictional wetlands have been recorded on a site map. This map includes the boundary and acreage of each associated wetland area, along with wetlands which have been dredged or filled and no longer meet wetland criteria. This map will be made available to personnel involved in the project design at the FEMP site, and a copy will be kept in the Administrative Record.

Avoidance of Impacts: Avoidance of wetland impacts will be considered and project activities will be positioned to avoid wetland impacts when practicable. The wetland delineation map will be provided to project engineers at the inception of projects and remedial design and removal action work plans to promote avoidance. The NRM Department will provide oversight to ensure avoidance.

Minimization of Impacts: If avoidance is not possible, minimization of impacts will be considered. This will involve project modifications and may result in permit conditions imposed by regulatory agencies. Best Management Practices will be utilized during and after remedial activities to minimize impacts to wetlands. Examples of Best Management Practices include: 1) construction of silt fences; 2) establishment of buffer zones (switchgrass) and/or shrubby upland buffer areas; and 3) training of construction equipment operators in avoiding wetlands. The NRM Department will provide oversight to ensure minimization.

Compensatory Mitigation of Unavoidable Impacts: The COE and EPA may require compensation for the wetlands lost or damaged as a result of the project. Mitigation may be required as a permit condition for non-CERCLA activities or as a substantive requirement under CERCLA. The COE and EPA prefer that the compensatory mitigation take place in areas adjacent or contiguous to the impacted wetlands (on-site mitigation). If on-site mitigation is not practicable, off-site measures will be considered and will occur within the same watershed or geographic region as the impact(s). A wetland mitigation plan for the FEMP site will be formulated to address wetland impacts.

Activities leading to potential mitigation are anticipated primarily as a result of CERCLA remedial actions. However, it is possible that other non-CERCLA related projects may lead to the loss of wetlands. As part of the NEPA evaluations integrated into the RI/FS documents, losses to wetlands will be identified; specific mitigation commitments that are established with the CRUs will be published in the resulting decision documents [Records of Decision (RODs) and Findings of No Significant Impact (FONSI)].

Preservation and Surveillance: The NRM Department will be responsible for preservation and surveillance on a project by project basis. Caution tape will be placed on the perimeter of anticipated non-impact wetlands to control vehicle access. These wetland areas will be preserved and enhanced by maximizing wildlife usage (e.g., installation of nest boxes), controlling nuisance plant growth when necessary, and promoting preferred plant growth. Dry conditions during the summer months would facilitate manual removal of nuisance growth and removal of litter/debris.

Field surveillance of ongoing projects will be implemented by the NRM Department to ensure wetland preservation and Best Management Practices. A field surveillance sheet will be used to record findings and make appropriate recommendations.

### 3.0 WILDLIFE HABITATS

#### 3.1 Regulatory Drivers

Fish and Wildlife Coordination Act: The Fish and Wildlife Coordination Act [§ 2(a) 16 U.S.C.A. 662(a)] recognizes the importance of wildlife resources to the United States and calls for consideration of wildlife conservation, specifically for water resource development programs. The Act also authorizes the Secretary of Interior to provide assistance in the development and protection of all wildlife species and to survey wildlife within the public domain. Provisions of this law reinforce the value and need for conservation of natural resources, specifically wildlife. Courts have ruled that satisfactory compliance with NEPA may automatically establish compliance with the Fish and Wildlife Coordination Act.

#### 3.2 Description of FEMP Wildlife Habitats

3.2.1 Terrestrial Habitats: Ecosystems within the FEMP property are diverse, with leased pasture and woodlots grazed by cattle, ungrazed grasslands, pine plantations, early and mid-successional woodlots, and riparian areas along Paddys Run (Facemire *et al.*, 1990) (Figure 3-1). Mammal and bird species are found in all of these habitats. Abundant mammals throughout the FEMP include the white-tailed deer (*Odocoileus virginianus*) and the eastern cottontail rabbit (*Sylvilagus floridanus*). Many birds are common throughout the property including the common grackle (*Quiscalus quiscula*), eastern meadowlark (*Sturnella magna*), mourning dove (*Zenaida macroura*), barn swallow (*Hirundo rustica*), American robin (*Turdus migratorius*), American goldfinch (*Carduelis tristis*), indigo bunting (*Passerina cyanea*), northern cardinal (*Cardinalis*), field sparrow (*Spizella pusilla*), song sparrow (*Melospiza melodia*), and the red-winged blackbird (*Agelaius phoeniceus*). (However, other organisms are found within specific habitats because of ecological constraints.)

Grasslands: Natural grassland habitats were not common to this area before the development of the agriculture; therefore, the grassland communities at the FEMP are non-native. Grasses that can be found in undisturbed areas include timothy (*Phleum pratense*), red top (*Agrostis* sp.), ragweed (*Ambrosia* sp.), moth mullein (*Verbascum blatteria*), and wild parsnip (*Pastinaca sativa*).

{This page left blank intentionally}

# HABITAT TYPES PRESENT AT THE FERNALD SITE



FORMER  
PRODUCTION  
AREA

*Paddy's  
Run*

## Legend

-  Introduced Grassland
-  Planted Pines
-  Riparian
-  Woodlands Early/Mid- Succession
-  Inactive Flyash Pile

Note: Habitat Boundaries are Approximate.

000032

6364

{This page left blank intentionally}

Disturbed areas have been created by cattle grazing on 128 ha (321 acres) of land leased to local landowners, as well as mowed areas at different locations on FEMP property. These communities are composed of red fescue (*Festuca rubra*) and other fescue species, Kentucky bluegrass (*Poa pratensis*) and other bluegrass species, and orchard grass (*Dactylis glomerata*). Other species include brome grass (*Bromus* sp.), red top (*Agrostis alba*), timothy, chickweed (*Stellaria media*), buttercup (*Ranunculus* sp.), winter cress (*Barbarea vulgaris*), red and white clover (*Trifolium pratense* and *T. repens*), ironweed (*Vernonia* sp.), thistle (*Cirsium* sp.), yarrow (*Achillea millefolium*), and goldenrod (*Solidago* sp.).

The grassland areas are generally inhabited by small mammals and several species of birds. Facemire *et al.*, (1990) recorded taxa such as the white-footed mouse (*Peromyscus leucopus*), which was the most common of the five non-game small mammals identified on property, as well as the short-tailed shrew (*Blarina brevicauda*), meadow vole (*Microtus pennsylvanicus*), meadow jumping mouse (*Zapus hudsonius*), and the eastern chipmunk (*Tamias striatus*). The birds common in these habitats include the eastern kingbird (*Tyrannus*), American crow (*Corvus brachyrhynchos*), European starling (*Sturnus vulgaris*), killdeer (*Charadrius vociferous*), eastern meadowlark, red-winged blackbird, Savannah sparrow (*Passerculus sandwichensis*), and bobwhite quail (*Colinus virginianus*).

Pine Plantations: The pine plantations [ $\pm 41$  ha ( $\pm 100$  acres)] were planted in 1972 with alternating blocks of white pine (*Pinus strobus*) and Austrian pine (*Pinus nigra*), with occasional Norway spruce (*Picea excelsa*). In recent years, the Austrian pines have become infected with tip blight (*Diplodia pinea*), a parasitic fungus which blocks the tree's xylem (tubes for nutrient transport). Also, the pine plantations have never been thinned and are overcrowded. This overcrowding limits the circulation between infected trees and causes accelerated spread of the fungus. Many of the Austrian pines have died but remain standing in the plantation. Mammal species in the pine plantations are dominated by white-tailed deer. Facemire estimated that 15 deer occupied the pine plantation in 1986. Small mammal populations are primarily composed of deer mice (*Peromyscus maniculatus*), with occasional meadow voles. This is also optimal habitat for the eastern cottontail rabbit, with an estimated population of 1.4 to 4 rabbits per ha. The most common bird taxa are the gray catbird (*Dumetella carolinensis*), cedar waxwings (*Bombicilla cedrorum*), common yellowthroat (*Geothlypis trichas*), field sparrow, eastern woodpewee (*Contopus virens*), and the willow flycatcher (*Empidonax traillii*).

Early and Mid-Successional Woodlands: Early successional woodlots, located at the north section of the FEMP property and the Inactive Flyash Pile [ $\pm 51$  ha ( $\pm 127$  acres)], are dominated by white ash (*Fraxinus americana*) and American elm. Typical pioneer successional species such as Japanese honeysuckle (*Lonicera japonica*), blackberry (*Rubus* sp.), and multiflora rose (*Rosa multiflora*) are also present. Mid-successional woodlands located in the northwestern section of the property are characteristically dominated by American elm (*Ulmus americana*) in the canopy. Other species include slippery elm (*Ulmus rubra*), box elder (*Acer negundo*), sugar maple (*Acer saccharum*), and Ohio buckeye (*Aesculus glabra*). The understory is composed of sugar maple and Ohio buckeye.

Many species of birds are common to both the early and mid-successional woodlands. Although the early woodlands can often support grassland species, the majority of the birds are found only in the woodland areas. The common species include red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), northern flicker (*Colaptes auratus*), chimney swift (*Chaetura pelagica*), eastern wood-pewee, yellow-billed cuckoo (*Coccyzus americanus*), Carolina chickadee (*Parus carolinensis*), tufted titmouse (*Parus bicolor*), white-breasted nuthatch (*Sitta carolinensis*), house wren (*Troglodytes aedon*), common yellowthroat, and the rufous-sided towhee (*Pipilo erythrophthalmus*).

Mammals utilizing the woodlots for food and shelter include the eastern cottontail, white-tailed deer, short-tailed shrew, and the deer mouse.

Riparian woodlands: The riparian woodland area is the corridor along Paddys Run and the SSOD [ $\pm 24$  ha ( $\pm 60$  acres)]. The woodland is characterized as a maple-cottonwood-sycamore floodplain forest (Anderson 1982) based on the dominant species [hackberry (*Celtis occidentalis*), eastern cottonwood (*Populus deltoides*), and American elm]. The species' composition in the riparian woodlot is similar to that of other woodlots at the FEMP. Areas bordering the streambed are characteristically supported by cattails (*Typha* sp.) and sedges (*Carex* sp.) that grow along the banks.

Although this habitat is utilized by most bird species found in the property woodlands, several taxa are primarily found only in the riparian area. The most common taxa include the belted kingfisher (*Megasceryle alcyon*), blue jay (*Cyanocitta cristata*), Carolina wren (*Thryothorus ludovicianus*), eastern phoebe (*Sayornis phoebe*), warbling vireo (*Vireo gilvus*), orchard oriole (*Icterus spurius*), and the northern



oriole (*Icterus galbula*) (Facemire *et al.*, 1990). Based on incidental observations, Facemire *et al.*, (1990) reported typical woodland amphibians and reptiles such as the eastern box turtle (*Terrapene carolina*), spring peeper (*Hyla crucifer*), American toad (*Bufo americanus*), northern water snake (*Nerodia sipedon*), and snapping turtle (*Chelydra serpentina*) in the riparian area of Paddys Run. Bats are common in the riparian area including the big brown bat (*Eptesicus fuscus*), red bat (*Lasiurus borealis*), and the little brown bat (*Myotis lucifugus*). These species reside in dead trees and under loose bark and feed on insects found in the riparian area. Mammal diversity is similar to woodland community with respect to species composition.

3.2.2 Aquatic habitats: Aquatic habitats on or adjacent to the FEMP property include wetlands, the Great Miami River, and Paddys Run.

Wetlands: A property-wide delineation was completed in 1993, assessing the wetlands located on the FEMP property; 14.5 ha (35.9 acres) of land have been designated as wetlands, including palustrine, forested wetlands, drainage ditches and swales, and isolated persistent emergent and isolated scrub/shrub persistent wetlands. The forested wetlands located within the early successional woodland area are dominated by woody plants such as green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), shellbark hickory (*Carya laciniosa*), American sycamore (*Planatus occidentalis*), eastern cottonwood, American elm, and shrub layers [roughleaf dogwood (*Cornus drummondii*), multiflora rose, Tartarian honeysuckle (*Lonicera tartarica*), and riverbank and frost grape (*Vitis riparia* and *V. vulpina*)]. Property-wide herbaceous plants in wetlands include red fescue, yellow nutgrass (*Cyperus esculentus*), soft rush (*Juncus effusus*), broad-leaf cattail (*Typha latifolia*), green bulrush (*Scirpus atrovirens*), swamp milkweed (*Asclepias incarnata*), moneywort (*Lysimachia nummularia*), Pennsylvania smartweed (*Polygonum pensylvanicum*), and marsh marigold (*Caltha palustris*). The wooded wetlands and persistent shrub/scrub wetlands are inhabited by the same species common in the FEMP property woodlands and ungrazed grasslands. Waterfowl such as mallards (*Anas platyrhynchos*), wood ducks (*Aix sponsa*), and spotted sandpipers (*Actitis macularia*) have been sighted in the wetland areas, in the riparian woodlots, and in the storm water retention basins. The wetlands are discussed in more detail in Chapter 2.0.

Great Miami River: The Great Miami River, a tributary of the Ohio River, supports a diverse aquatic ecosystem. Eighty genera of algae have been recorded in the Great Miami River over an eight-year

period (1974-1982) [U.S. Geological Survey (USGS 1990)]. The majority of the genera were represented by blue-green algae (Cyanophyta), green algae (Chlorophyta), and diatoms (Chrysophyta). The genera in the greatest abundance included the diatoms *Cyclotella* and *Nitzschia*, the green algae *Cosmarium*, *Dictyosphaerium*, *Micratinium*, and *Scenedesmus*, and the blue green algae *Agmenellum*, *Anacystis*, and *Oscillatoria*.

The river also supports a diverse macroinvertebrate community represented by 60 taxa which were collected for the RI/FS by Advanced Sciences, Incorporated. Abundant insects include caddisflies (family Hydropsychidae), non-biting midges (family Chironominae), blackflies (family Simuliidae), and mayflies (families Baetidae and Heptageniidae). Other invertebrate taxa include segmented worms (families Naididae and Tubificidae), clams (families Corbiculidae and Sphaeriidae), and snails (families Lymnaeidae, Physidae, and Pleuroceridae).

In the Great Miami River, 106 species of fish were recorded from 1900 to 1978 (Trautman 1981). Annual electrofishing surveys have been conducted from 1984-1992 by University of Cincinnati researchers (Miller *et al.*, 1993). Thirty-four species from nine genera were collected in 1992, with the most common species being gizzard shad (*Dorosoma cepedianum*). Other common families include carp and shiners (Cyprinidae), catfish (Ictaluridae), drum (Sciaenidae), sunfish (Centrarchidae), and suckers (Castosomidae).

Paddys Run and Associated Tributaries: Ephemeral in sections, Paddys Run and its tributaries (including the SSOD) support a diverse community of macroinvertebrates and fish. While there have been no algal surveys, the macroinvertebrate community is typical of a stream of its size in this region. During the 1988-89 RI/FS sampling, 70 taxa of invertebrates were collected with the majority being insects. Common inhabitants include non-biting midges, caddisflies, mayflies (families Baetidae, Caenidae, Ephemeridae, and Heptageniidae), and stoneflies (families Nemouridae and Perlodidae). Riffle beetles (*Stenelmis* sp.) and isopods (*Lirceus* sp.) were also present. In an additional survey of Paddys Run, Facemire *et al.*, (1990) found similar results in diversity and identified 56 taxa at 10 sampling sites. Present at all 10 sites sampled along Paddys Run, the most abundant species were non-biting midges (*Chironomus* sp.), riffle beetles, mayflies (*Caenis* sp.), and stoneflies (*Allocarpia* sp.). Other common taxa were mayflies (*Stenonema bipunctatum*), isopods (*Lirceus fontinalis*), caddisflies (*Cheumatopsyche*

sp. and *Hydropsyche* sp.), segmented worms (family Oligochaete), blackflies (*Simulium* sp.), and stoneflies (family Nemouridae).

Facemire *et al.*, (1990) recorded 23 species of fish in Paddys Run on the FEMP property. The most common species were the bluntnose minnow (*Pimephales notatus*), creek chub (*Semotilus atromaculatus*), and the stone roller minnow (*Campostoma anomalum*). Other abundant species include rosefin shiner (*Notropis ardens*), Johnny darter (*Etheostoma nigrum*), orangethroat darter (*Etheostoma spectabile*), fantail darter (*Etheostoma flabellare*), and spotfin shiner (*Notropis spilopterus*). In a similar study, Miller *et al.*, (1993) found similar diversities with 13 species at one sample site at the New Haven bridge. The majority of the fish were represented by minnows (*Pimephales*) and darters (*Etheostoma*).

### 3.3 Management Objectives and Goals

Proactively Enhance and Manage Wildlife Areas of the Property: Wildlife areas within the 425-ha (1050-acre) FEMP property are the responsibility of the DOE to manage. Wildlife areas are natural resources on the FEMP property and are subject to injury determination and potential damage assessment awards under Natural Resource Trusteeship; therefore, these areas within the FEMP property shall be managed in order to provide the greatest benefit to wildlife consistent with the overall goal of remediating the site. Management objectives include protection of habitats, promotion of native plant and animal diversity, and elimination of non-native species of plants and animals.

The management plan presented below provides a variety of methods for natural resource management at the FEMP. As a trustee of the natural resources on its property, the DOE has the responsibility of stewardship for its land. The primary responsibility of the DOE is the safe, least cost remediation of the site. Natural resource management activities should not interfere with the remediation of the FEMP but should be considered in remedial designs as mitigation to natural resource injuries.

Natural resource restoration activities, as either specified NEPA mitigation activities or restoration plans negotiated with other federal and state natural resource trustees, may employ some of the methods discussed in Chapter 3.4. All management activities mentioned below will not have to be used in future mitigation or restoration plans. This plan provides a variety of techniques for natural resource

management and restoration, from which several may be incorporated into specific management and restoration work plans.

As stated earlier, the NRMP is a framework document that establishes general goals and outlines a strategy for managing natural resources at the FEMP. The NRMP is not a work plan, so specific details pertaining to implementation of the objectives and goals are not included within this document. Specific work plans will be provided as separate documents for each management activity discussed and will supplement the NRMP.

### 3.4 Management Plan

Survey Wildlife Areas: In order to determine wildlife areas to be protected, managed, and enhanced, these areas must be surveyed on a regular basis. Such surveys may be qualitative assessments of a particular habitat or area, or they may be more in-depth, quantitative assessments.

Update Catalogue of Species: The most detailed survey of FEMP property habitats to date is the "Biological and Ecological Site Characterization of the FMPC" (Facemire *et al.*, 1990). This survey was conducted by Miami University (Ohio) researchers from the summer of 1986 through the spring of 1987. Results from this survey have been used to describe the FEMP site since its publication in 1990. While this information is useful, it is now seven years old and may be out of date. Wildlife surveys will be conducted to update the catalogue of species that Facemire *et al.*, (1990) established. Updated lists will be provided within future revisions of the NRMP.

Map Wildlife Areas: To provide decision makers with a clear picture of the biological resources of the FEMP, the wildlife areas will be mapped. These maps will be specific enough to show trends in vegetation, community diversity, and specific animal habitats within each wildlife area. The maps will convey the results of the updated catalogue of species.

Implement Management Plans for Each Wildlife Area: For the most part, wildlife areas at the FEMP will be isolated from each other; therefore, each wildlife habitat shall be assessed individually as a separate ecosystem, and the management plan shall reflect this. The items listed below are not all-

inclusive. Additional management activities may be utilized based on input from other interests such as stakeholders and natural resource trustees.

#### Grasslands:

- Create no-mow areas in non-leased grasslands. Some no-mow plots shall be cut every other year to keep the area as an early successional grassland. Other no-mow plots will have intermittent strips cut through them to increase edge habitat. Other areas shall be left alone so that woody vegetation may take over the area. Access to groundwater monitoring wells, survey markers, and sampling grids will be maintained.
- Plant native species in the no-mow areas. Native grasses and herbaceous vegetation shall be seeded in certain no-mow areas. In order to promote native species growth, selective mowing, weed control, and ground disking may be necessary.
- Install bluebird boxes throughout leased and non-leased grasslands. Bluebird boxes shall be placed in strategic locations throughout leased and non-leased grasslands to promote this bird species. This activity originated from a citizens task force recommendation in 1990. The FEMP has excellent habitat for bluebirds and the program has proved to be a successful employee and community relations program.

#### Early and Mid-Successional Woodlands:

- Selectively harvest trees. Selective harvest of trees has several benefits. Small clearings may be opened up in woodlands, which would promote diversity of vegetation and habitats. Woodlots may be thinned to increase the health of the remaining trees. This opens up the forest floor for wildlife and promotes diversity through the increased presence of sunlight.
- Remove non-native vegetation. Certain species of plants have been introduced into the United States in the past 200 years. These include Japanese honeysuckle (*Lonicera*

*japonica*) and multiflora rose (*Rosa multiflora*). These species are very tolerant and thrive within the early and mid-successional woodlots, choking out less tolerant native species of vegetation. Non-native vegetation may be removed, opening up the forest floor and promoting native plant growth.

- Install wildlife boxes and owl platforms. General use wildlife boxes may be installed within the early and mid-successional woodlots. A variety of wildlife may utilize these boxes, including pileated woodpeckers, squirrels, and certain owls. Other owl species may benefit from installing owl platforms, which consist of old automobile tires attached to plywood. This supplies a solid base for nest building.
- Plant tree species. Certain hardwoods may be planted within existing woodlands to increase the diversity and size of the woodlot, benefiting wildlife.

#### Riparian Corridors:

- Control bank erosion. Severe erosion is present along several reaches of Paddys Run. This erosion slowly diminishes the amount of riparian habitat present at the FEMP. Methods of natural erosion control may be employed to slow or cease the erosion occurring along Paddys Run. These methods include placing tree revetments along eroding banks and revegetating banks.
- Conduct management activities similar to those described in the woodland management section. Many riparian areas are very similar to the early and mid-successional woodlands at the FEMP property and therefore are subject to similar management activities.
- Pick up refuse within Paddys Run. Refuse and other undesirable items that have been washed into Paddys Run may be removed. Periodic walkthroughs of Paddys Run will be scheduled to remove undesirable objects within Paddys Run.

**Pine Plantations:**

- Remove selected trees to thin the stand. Selected trees or rows of trees may be cleared from the pine plantations to thin the stand. This would improve the health of the remaining trees and would create openings that would increase diversity and edge habitat.
- Plant hardwood species among the pines. A stand of similar trees that are the same age is not a diverse habitat. Planting hardwoods may be performed among the pines to increase the diversity of the pine plantations.
- Place salt blocks within the plantations. Salt blocks or loose salt may be placed within the pine plantations to promote white-tailed deer, which are inhabitants of this area within the FEMP.
- Build brush piles in cleared areas. Trees thinned from the pine plantations may be stacked within the pine area to create habitat for a variety of small mammals.
- Install general use wildlife boxes. For the same reasons described in the woodland habitat section, general use wildlife boxes may be installed within the pine plantations.

Many of these activities, such as the bluebird box program and the placement of salt for deer, is the presently accomplished by a volunteer organization called the Wildlife Enhancement Team. The organization is composed of volunteers from many different divisions at the FEMP to direct low-cost natural resource restoration and management activities. The Wildlife Enhancement Team may be used in the future to complete many of these activities discussed above.

{This page left blank intentionally}



#### 4.0 THREATENED AND ENDANGERED SPECIES

##### 4.1 Regulatory Drivers

Endangered Species Act: The Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.) requires the protection of any federally-listed threatened or endangered species at the FEMP property. The applicable implementing regulations for this act are 50 C.F.R. 17 (1975) and 50 C.F.R. 402 (1986). ESA was enacted because of the findings of Congress that various species of wildlife and plants have become extinct due to economic growth, and that these species of wildlife and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the United States. ESA states that all federal agencies must seek to conserve threatened and endangered species. The Department of Interior maintains a list of all plant and animal species that have been determined to be threatened or endangered. One plant and one animal species from this federal list may occur at the FEMP property: the running buffalo clover (*Trifolium stoloniferum*) and the Indiana bat (*Myotis sodalis*) (Appendix A).

State Endangered Species Law: The State of Ohio has enacted comparable laws and regulations to the ESA. These enactments reflect the State's commitment to endangered species preservation established by the ESA. The State's regulations are: Ohio Revised Code Chapter 1518 and sections 1531.25 and 1531.99, and OAC sections 1508:18-1 and 1508:18-2. In addition, the state laws institute a system of listing plants and animals that are threatened or endangered within the state. When assessing impacts to threatened and endangered species, the FEMP property considers state as well as federally designated species. Several species of plants and animals from the state list may or do occur on FEMP property. These species include: cave salamander (*Eurycea lucifuga*), slender fingergrass (*Digitaria filiformis*), and Sloan's crayfish (*Orconectes sloanii*) (Appendix A).

##### 4.2 Description of Threatened and Endangered Species

Indiana bat (*Myotis sodalis*): The Indiana bat was listed as federally endangered in 1967. This bat typically hibernates during the winter in limestone caves with standing water. During the summer, the Indiana bat colonizes in hollow trees and under loose bark. These colonies are usually found near streams, where the bats feed on flying insects at night.

In 1988, a survey was conducted to determine whether or not the Indiana bat was present at the FEMP property. The survey concentrated on the riparian areas along Paddys Run. While no Indiana bats were found at the FEMP property, it was determined that excellent habitat did exist on property along one stretch of Paddys Run. In addition, echolocation identified species from the same genus inhabiting Paddys Run. This 1988 survey also included locations other than the FEMP property. A population of Indiana bats was found along Banklick Creek, a tributary of the Great Miami River located approximately 5.3 km (3.3 mi) northeast of the property. An updated survey at the FEMP will be conducted in June and July along Paddys Run and the Storm Sewer Outfall Ditch.

Running buffalo clover (*Trifolium stoloniferum*): This species of clover can be found in disturbed habitat between open forests and pastures. Running buffalo clover was listed as federally endangered in 1987. At that time, the clover was known to occur at only one location in West Virginia. This species has since been reported in Hamilton County, Ohio.

Surveys in 1986 and 1987 did not record running buffalo clover at the FEMP property. However, the Ohio Department of Natural Resources (ODNR) indicates that this species inhabits Miami Whitewater Forest, located approximately eight km (five mi) from the FEMP. A comprehensive survey will be conducted in appropriate grassland and riparian habitat at the FEMP.

Cave salamander (*Eurycea lucifuga*): These salamanders are listed as endangered by the State of Ohio. They prefer to live in the dimly lit entrances to limestone caves, but can also be found in forested areas or along narrow, intermittent streams, spring houses, and limestone-lined wells.

The ODNR has recorded three locations within Miami Whitewater Forest that contain populations of cave salamanders. A 1988 survey of the salamander in and around the FEMP property located a population of cave salamanders at the Ross Trails Girl Scout Camp (0.5 km north of the FEMP property) but none on the FEMP property itself. An additional survey, completed in 1993, found no individuals on FEMP property, and only two were found at the Ross Trails control location (Davis 1994). However, this may have been a result of the relatively dry summer in 1993. Moderate habitat is located in one on-property well and marginal habitat is located in a ravine in the north woodlot. An off-property, limestone-lined well south of the FEMP property was also determined to be moderate habitat.

Sloan's crayfish (*Orconectes sloanii*): The Sloan's crayfish is listed as threatened by the ODNR. This species is only found in Ohio and Indiana and prefers small, rocky streams. Qualitative data from a 1993 survey show populations residing in northern sections of Paddys Run on property near the train trestle and southern sections of Paddys Run off property near New Haven Road (St. John 1993). During this survey, the stream was dry between these two locations. The nearest record of this species is in the Dry Fork of the Whitewater River at the bridge at New Haven Road, east of New Haven. A follow-up survey in May 1994 determined that the on-property population had shifted south to more suitable habitat with the presence of flowing water. However, the crayfish remain confined to the northern section of Paddys Run because of the restriction of the intermittent water flow throughout the year.

Slender fingergrass (*Digitaria filiformis*): This state endangered crabgrass blooms from August to October and prefers full sun in sterile, sandy soils. In Ohio, slender fingergrass is confined to sandy native prairie habitat. The 1986 survey located this species at the FEMP property in the riparian habitat. An updated survey will be performed in August 1994.

Mountain bindweed (*Polygonum cilinode*): This plant species is recorded by the State of Ohio as endangered. It blooms from June through August and can be found in openings and clearings in forested areas. ODNR recordings have been limited to the northeastern counties of Ohio. However, the 1986 survey reported mountain bindweed inhabiting the riparian woods and pine plantations of the FEMP property. An updated survey will be conducted in June-August 1994.

Migratory Birds: There are several species of threatened and endangered migratory birds that pass through the FEMP property in the spring and fall or winter. This list of birds does not represent all threatened or endangered birds that inhabit the FEMP property, but rather birds that have actually been spotted on property. These birds include:

- northern harrier (*Circus cyaneus*)
- northern waterthrush (*Seiurus noveboracensis*)
- dark-eyed junco (*Junco hyemalis*)

#### 4.3 Management Objectives

Impact Minimization and Avoidance: All activities that are conducted at the FEMP property, whether inside the 425-ha (1050 acre) property boundary or around the surrounding area, shall be planned, implemented, and monitored in such a way as to minimize the impacts to threatened and endangered species. Impact minimization includes an effort to avoid disturbance to these species and possible assistance to support habitat and individuals.

#### 4.4 Management Plan

Survey Every Three Years: To keep information of threatened and endangered species at the FEMP property current, surveys for such species shall be conducted at least every three years. Reviews of current state-listed and federally-listed threatened and endangered species lists shall be conducted annually to update the status of wildlife populations of the FEMP property.

Map Sensitive Habitats: Once surveys for threatened and endangered species have been conducted, the information gained on species populations and suitable habitat shall be recorded on a FEMP property map. One map shall include locations of all threatened and endangered species and suitable habitat that occurs in and around the FEMP property. This map shall be made available to personnel involved in the design of projects at the FEMP property. The map shall be updated as new surveys are conducted and projects are developed and implemented.

Promote Awareness and Avoidance: As stated before, impacts to threatened and endangered species should be avoided whenever possible. The mapped population locations and suitable habitats will be provided to project engineers and managers so that remedial designs or removal action work plans can be prepared with impact avoidance in mind.

Minimize Unavoidable Impacts: Where short-term impacts to threatened and endangered species are unavoidable, steps shall be taken to minimize those impacts including removal of individual species. Appropriate engineering controls (silt fences, straw bales, and diversion of water) are also appropriate measures to prevent erosional impacts to threatened and endangered species.

Mitigation: Where long-term impacts are unavoidable, mitigation shall occur on property or off property in the event that these species are found at the FEMP property. As discussed in Chapter 1.0, mitigation activities would be closely coordinated with the CRUs as part of the remedial action. Future data gathered during species surveys may yield additional options for the mitigation efforts. Mitigation efforts will be monitored by NRM personnel to determine if any impacts have occurred to these resources. The potential for Natural Resource Damage Claims is increased if mitigation is not sufficient. The following are potential mitigation measures:

- On-Property Enhancement of Habitat: Boxes for the Indiana bat may be placed in other areas of the FEMP property along Paddys Run to encourage breeding. The appropriateness of on-property mitigation will be evaluated on a case by case basis. Depending on the end use of the site, it may not be a feasible option to enhance habitat on property.
- On-Property and Off-Property Relocation of Species: Sloan's crayfish may be moved to other sections of Paddys Run if the extent of construction activities does not alter the stream on a long-term basis. Thorough monitoring is appropriate after the relocation to ensure survival. The constraints for this organism are similar to other species of crayfish in this area. However, it is not likely that we can relocate threatened and endangered to other locations at the FEMP, based on the specificity of the habitat conditions.
- Off-Property Financial Support of Established Populations: Local areas with established populations may be financially supported by the FEMP for habitat restoration and preservation in the event that relocation of species is not possible.

{This page left blank intentionally}

## 5.0 CULTURAL RESOURCES

### 5.1 Regulatory Drivers

National Historic Preservation Act (NHPA), 16 U.S.C. 470 et seq. The NHPA was amended in 1992. NHPA §106 and §110 require that every federal agency "take into account" each of its undertakings that could affect historic properties. An "undertaking" includes a wide range of activities such as conservation, grants, licenses, permits, federal property, transfers, rehabilitation repair, demolition, release permits, and many other types of involvement. The NHPA was amended to take into consideration and protect the interests and needs of both historic preservationists and federal agencies.

The purpose of NHPA §106 is to protect properties listed in or eligible for the National Register of Historic Places (referred to as the National Register). The National Register could include properties such as buildings, structures, objects, sites, districts, and archeological resources. There are several areas around the FEMP site that are listed in the National Register and more that have the potential to be listed.

The NHPA provides for the assessment of civil penalties where applicable regulation or permits have been violated under the NHPA.

The implementing regulations for NHPA §106 [36 C.F.R. Part 800 (1992)] were enacted to define the process to be used by the federal agency in meeting its NHPA responsibilities. Other regulations pertaining to the FEMP site include: 1) 36 C.F.R. Part 60 (1992), setting forth the procedures and requirements for listing properties in the National Register; 2) 36 C.F.R. Part 61 (1992) giving the guidelines for approving state historic preservation programs; and 3) 36 C.F.R. Part 79 (1992), the regulations establishing definitions, standards, procedures, and guidelines for federal agencies to preserve collections of prehistoric and historic materials, remains, and associated records. These regulations are followed in managing the archive of materials found at the FEMP site.

Native American Graves Protection and Repatriation Act, 25 U.S.C. §3000: The Native American Graves Protection and Repatriation Act (NAGPRA) establishes a process for the return of certain human remains and other cultural items presently held by federal agencies or other institutions to American Indians, Native Hawaiians, and Native Alaskans. This law also gives these groups a formal role in

decisions about activities carried out on federal and tribal lands that may affect archeological resources of importance. This act would be applicable to the FEMP site should human remains or other cultural items be discovered during construction and/or other activities on the site.

Archaeological and Historic Preservation Act of 1976, 16 U.S.C. §469: This act requires notification to be given to the Secretary of Interior whenever there is the threat of irreparable loss or destruction of significant scientific, prehistoric, historical, or archeological data by federal projects.

Archeological Resources Protection Act of 1979, 16 U.S.C. §470(aa) - 470(ll): This act provides for additional protection of archeological resources on public and Indian lands and encourages the sharing of archeological information.

## 5.2 Overview of Regional Cultural Resources

The population and cultural growth of an area are determined by factors such as geologic setting, surface waters, soils, vegetation, and climate. The FEMP site and surrounding area are located within a three mile wide subterranean valley formed as a result of Pleistocene glaciation. The remaining glacial outreach made the valley's soil rich and thus, good for farming and construction. The FEMP site and surrounding area are located near the Great Miami River, which provided a source of water for early residents. Historically, these combined factors made the FEMP site and surrounding area desirable as a settlement place.

As a result of this desirability, the area is rich with diverse cultural resources. Several examples can be seen in the photographs in Appendix A. This desirability is further evidenced by the number of periods represented in the area's history. From pre-historic times to the late eighteenth century, several different periods of peoples have been identified as living within the FEMP site and surrounding areas. These periods are discussed below in more detail.

Paleo-Indian Occupation: The earliest people to have inhabited the area were the nomadic Paleo-Indian people (12,000 BC - 8000 BC). The earliest Paleo-Indian material was found at the Meadowcraft Rockshelter in Pennsylvania ranging from 14,555 BC to 13,955 BC. These first inhabitants of the FEMP site migrated from the south and moved across the state as the glacier retreated and the area supported



large mammals. Paleo subsistence was based upon the hunting of these large mammals such as the musk ox, giant beaver, and woolly mammoth. Paleo sites are typically located on bluffs or hilltops overlooking main river valleys. Artifacts recovered from these sites include fluted points made with good quality cherts, an impure form of flint.

Archaic Occupation: Early Archaic People (8000 BC) settlement patterns reflect the change in environment to warmer and drier conditions. This warmer climate increased the forest and plant development in this area. Smaller animals, such as the white-tailed deer, became the subsistent species hunted by the early Archaic people. Woodworking tools (celts) and grinding stones were added to the assemblages. They also utilized axes, gauges, drills, bifurcate and Kanawha points, and knives. Early Archaic sites tend to be small and scattered, located in uplands near secondary stream valleys.

During the Middle Archaic period (6000 BC), climate improvements led to a diversification in the economy of the Middle Archaic people. Emphasis was still on hunting the white-tailed deer, with emphasis on a wider variety of plant foods. The material remnants of Middle Archaic culture include side-notched points, polished stone tools, fully grooved axes, pendants, and winged and cylindrical hammerstones used as atlatl weights. Bone tools were also added to the artifact assemblage.

The Late Archaic period began about 3000 BC and lasted until about 2000 BC in this area. Specialized objects were utilized such as sandstone bowls, stone tubes, polished plummets, net sinkers, whistles, birdstones, boatstones, and bone awls. Ceremonialism became important and more elaborate. Mortuary practices began and exotic burial goods were produced. Late Archaic sites are large in size and represent occupation over long periods of time. The first cultigens (or cultivated plants) are associated with this time period.

Early Woodland (Adena 1000 BC): The Adena People are associated with the Early Woodland Period in this area. The territory occupied by the Adena Indians extended from southeastern Indiana to southwestern Pennsylvania, and from north central Ohio to central Kentucky. Three major innovations took place in the Late Archaic, Early Woodland Period: the making of pottery, horticulture, and the burial of the dead in earthen mounds. Ritualized status, such as ranked burials, were part of the Adena ceremonial complex.

Two types of Adena ceramics, plain and cardmarked, are common in this area. Projectile points on the ceramics were finely made with a variety of stemmed bases. Leaf-shaped blades were also produced. Copper was used in ornaments such as beads, bracelets, gorgets, and reels. Other assemblages include tubular pipes, quadraconcave gorgets, pendants of slate, hematite celts, and incised stone tablets. The Adena People lived in semi-permanent villages.

The Middle Woodland culture period has been characterized as the Hopewell People (100 BC - 500 AD) complex in southern Ohio. Information about the Hopewellian culture has been obtained through mound excavations. This information reflects elaborate ceremonialism. Village and mortuary sites are concentrated in the larger villages. Some archaeologists view Hopewell as a religious cult. About three-fourths of the Hopewell burials were cremations with burials in the flesh presumably reserved for the highest social class. The dead were prepared for burial in charnel houses. The corpses were dismembered and cremated in shallow crematory basins. The undestroyed bones were deposited in graves in the charnel house floor. When the house became full, the house was dismantled and a mound built over the crematory and graves.

Hopewellian grave goods consisted of materials traded with other people from great distances. Funerary objects consisted of fresh-water pearls, copper, gold, mica, conch shells, and obsidian. A Hopewellian village and earthworks is located in the area of the FEMP site. This site is known as the Colerain Earthworks. At one time, the walls of the earthworks were about nine feet high and enclosed an area of ninety-five acres. The Hopewellian people remained in the area of the FEMP site until about 500 AD.

Late Woodland is represented by the Woodland Indians (500 AD - 1000 AD). Much of the characterization of the Woodland Indians is based on ceramic assemblages that have been found. Different pottery types, distinguished by tempering techniques, defines these assemblages that have been found. Cordmarked and limestone-tempered techniques were commonly used in the area of the FEMP site. Woodland lithic assemblage is represented by chesser notched points, chipped stone celts, slate or bone gorgets, awls, flaking tools, and flutes. The Woodland Indian villages were used as a base camp in the summer months so cultivated crops could be raised. After the harvest of crops, the base villages were abandoned for hunting camps in the nearby forests. At 1000 AD, the Woodland Tradition ended in the area of the FEMP site.

Mississippian Tradition (1000 AD - 1660 AD): The Turpin Phase, Fort Ancient (AD 1000 - 1250) - This phase takes its name from the Turpin site located on the Little Miami River in Hamilton County, Ohio. Turpin Phase sites are located in the Great Miami and Whitewater Rivers drainage area. Sites occur as far west as Laughing Creek in Ohio County, Indiana. Turpin Phase villages were oval in shape and some contained central plazas. Wall-trench style architecture has been recorded at three Turpin phase sites. One site is located north of the FEMP site in the Great Miami River Valley.

Two modes of disposal of the dead were practiced by the Turpin Fort Ancient people. Mounds were used for at least a portion of the population, while others were interred in shallow graves within the village area. Other burials took place in box-like coffins made of large slabs of limestone. Artifacts used by the Turpin people include shell-tempered pottery, elk antler spades, shell hoes, axes, drills, scrapers, knives, and awls. The Fort Ancient People were the first pre-historic group to use the bow and arrow in their area. They are also considered to be the first farmers of the Ohio Valley.

The Schomaker Phase, Fort Ancient (AD 1250- 1450) - The Schomaker village is located along the Great Miami River in Hamilton County, Ohio. Schomaker Phase villages are fewer in number than Turpin Phase villages. By AD 1350, only one major village was located in the lower Great Miami Valley.

The Schomaker village site is situated on a low rise along the Great Miami River and encompasses about four acres of land. Several hundred people occupied this village. Houses were arranged in a broad circle around a central plaza and were constructed partially underground. These semi-subterranean dwellings provided villagers with warmth in the winter and coolness in the hot summers. Schomaker Phase farmers discovered new techniques for storing agriculture products, such as underground silos constructed to store products like maize (corn).

Burial patterns during the Schomaker Phase are different from those of the Turpin Phase. Mound building ceased after AD 1250. Schomaker Phase burials are located in the belt around the village plaza or buried among the circle of houses. Pottery from the Schomaker Phase are decorated with curvilinear guilloche or line-filled triangles. At 1450 AD, ceramics change drastically; decorating pottery all but disappeared. These changes mark the beginning of the Mariemont Phase, Fort Ancient.

Mariemont Phase, Fort Ancient (AD 1450 - 1660) - By AD 1450, only one or two sites were occupied in the entire lower Miami Valley. The best known of these Mariemont Phase sites is the Madisonville village. Mariemont Phase sites have a number of unique material traits such as distinctive ceramics, bone and stone tools, mortuary customs, and the presence of European-manufactured goods. Mariemont graves contain one or more small pots placed by the hand or waist of the body, and probably contained food to sustain the individual in the after life. Village houses constructed around a central plaza during the Schomaker Phase had been abandoned by the Mariemont Phase. The size of the houses are three to four times larger than Turpin or Schomaker structures. This suggests that several families lived together in one structure. The Mariemont Phase of the Fort Ancient people ended at the Madisonville site about 1660 AD.

Historic Times 1660 AD: The Wyandot Indians lived on the southern shore of Georgia Bay in Canada. These villages were subject to attacks by the Iroquois Confederacy. By the mid-1600s, they were forced to abandon their villages and settle in northern Ohio. Wyandot County became their tribal center. One of their major villages was at the site of the present day Columbus, Ohio. The Wyandot aided the British during the Revolutionary War.

The Shawnee resided in southern Ohio until 1672 when the Iroquois forced the Shawnee to abandon their land and move to eastern Pennsylvania with the Delaware Indian. Both the Delaware and Shawnee moved back into Ohio between 1720 and 1745. The Shawnee town of Chillicothe (the first town with this name) was established at the mouth of the Scioto River near present day Portsmouth, Ohio. In 1758, a large flood forced the Shawnee to move up the Scioto River to one of the towns known in Ohio as Chillicothe (the second town with this name). Old Chillicothe (or the third Chillicothe) on the Little Miami River and Chillicothe at Piqua (or the fourth Chillicothe) on the Mad River were destroyed by George Rogers Clark in 1780. The Shawnee then established the fifth Chillicothe on the Great Miami River. In 1794, General Anthony Wayne defeated the Shawnee at the Battle of Fallen Timbers. The Treaty of Greenville ceded all Shawnee lands in most of Ohio, southern Indiana, and south of the Ohio River to the United States. In 1832, all Shawnee lands east of the Missouri River were ceded to the United States. All remaining Shawnee were removed to west of the Mississippi River.

In 1801, the land west of the Great Miami River was put on sale. Shawnee, Wyandots, Iroquois, and Miami Indians were still in the area of the FEMP site. Chief Kiata and his daughter Okeana of the

Miami tribe spent their summers in the area known as Camp Run. Kiata Creek and the present village of Okeana were named by the first settlers in honor of the Chief and his daughter.

### 5.3 Management Objectives

Impact Avoidance - Management objectives for cultural resources are to avoid, where possible, impacting cultural resources. One way to avoid impact is to ensure employees know and understand the applicable laws and regulations related to the protection of cultural resources.

Impact Minimization - Where an impact to cultural resources cannot be avoided (i.e., because of a human health and safety concern), activities will be executed to minimize the impacts that may occur as a result of the proposed activity.

### 5.4 Management Plan

The objective of the NRMP with respect to cultural resources is to identify regulations pertaining to cultural resources at the FEMP site, to establish site specific procedures, and to ensure compliance with the regulations and procedures.

The plan for managing cultural resources at the FEMP site consists of several elements and is managed by the Cultural Resource Coordinator (CRC) within the NRM Department. The management plan is currently being revised and will be updated annually. The elements of the management plan include:

Cultural Resources Management Plan (CRMP): The CRMP is a controlled document identifying the various locations of cultural resources on and around the FEMP site. The CRMP is currently being revised and will be updated annually.

Procedures: One key element in the management plan is procedures. The NRM Department is in the process of implementing new procedures and guidelines to address the impacts on cultural resources at and near the FEMP site due to ongoing construction projects. Discovery of unknown cultural resources may occur because there have been a number of significant archaeological sites found in the surrounding area. A procedure has been issued to address the discovery of resources in the field. This procedure

entitled, "Unexpected Discovery of Cultural Resources" effectively states the procedure for handling cultural discoveries and establishes the method by which the discoveries will be reported.

Archive: An archive has been established to house any discoveries and reports of discoveries. The archive is required by the State Historical Preservation Office (SHPO) so that the permitting of projects continues at the FEMP site. The archive is currently managed by the CRC within the NRM Department. All information relating to discoveries and mapped sites will be kept strictly classified with limited access to protect the cultural resource site(s) from being looted or destroyed. The information about the cultural discoveries will be used by construction and sampling personnel before construction and sampling activities begin. Information about the cultural resource site(s) will be supplied through the CRC on a "Need to Know" basis only because of the confidentiality of the material. The public would be informed of the discovery; however, the exact location would be kept confidential.

Education: In addition to procedures and an archive, the NRM Department has developed an educational plan to familiarize certain employees with the subject of historic preservation. Briefings have been and will continue to be given to employees involved in ground disturbing activities. The program is being expanded to include construction and planning personnel.

Retain Consulting Firm: The NRM Department is focusing on the prompt permitting of projects so all commitments can be met during the RI/FS process at the FEMP site. A cultural resources management consulting firm has been retained to help achieve this goal. The consulting firm will conduct archaeological surveys and assist in researching and preparing reports that are required by the regulations. One of the basic prerequisites for a consulting firm is that the firm be located within one hour's commuting time to the site, enabling quick response to FEMP site needs. In addition, the site's CRC is available at the site on a full-time basis.

Pre-Construction Surveys: Pre-construction surveys will be conducted for projects that have potential impact on cultural resources. The need to conduct surveys pursuant to requirements of Section 106 of the NHPA will be evaluated as part of the NEPA evaluation. The evaluation form is completed by the project manager and reviewed by the CRC. Reports outlining findings of the surveys will be forwarded to the SHPO, as necessary.

Consultation with SHPO: An ongoing goal in managing cultural resources is to establish and continue a working relationship with the SHPO. Ongoing consultation with the SHPO is common practice while

conducting field investigations on a project by project basis. Establishing such a relationship could expedite construction projects. This is especially significant to the FEMP site due to the integration of RCRA and CERCLA, which may require the SHPO's office to render decisions on situations not previously encountered by the office. For example, areas may have to be excluded from an archeological survey because of radiological concerns on site.

A programmatic agreement is currently being drafted for representatives of DOE-Fernald, the SHPO, and the Advisory Council on Historic Preservation. If signed, this agreement would enable the FEMP site to administer its own cultural resources program with annual oversight from the SHPO office, as opposed to the current project by project basis. This agreement is expected to be signed within the next six months to one year.

{This page left blank intentionally}



## 6.0 FLOODPLAIN MANAGEMENT

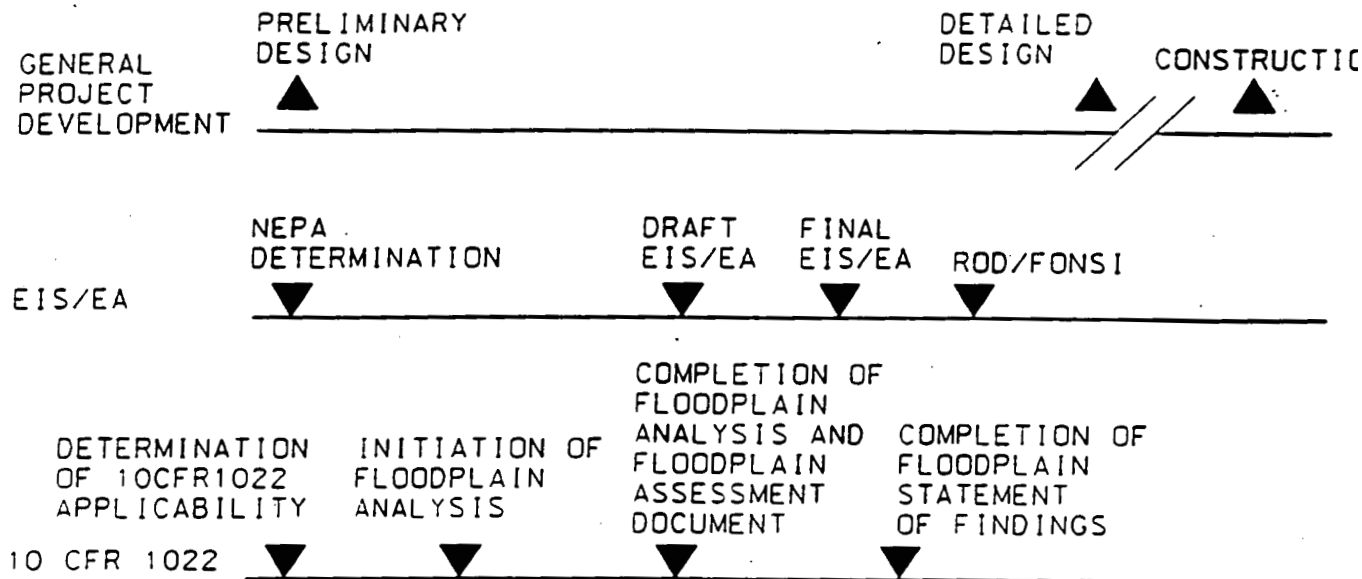
### 6.1 Regulatory Drivers

10 C.F.R. §1022: The documentation needed for a floodplain action under 10 C.F.R. §1022 involves: 1) a floodplain assessment which includes a description of the proposed action, a list of alternatives to the proposed action including a no-action alternative, and the floodplain impacts associated with the action(s); 2) a public Notice of Involvement (NOI) to perform a floodplain review which describes the proposed action and its location; and 3) a Statement of Findings which contains a brief description of the proposed action, location map, an explanation of why the action is proposed to be located in the floodplain, a list of alternatives considered, a statement indicating whether the action conforms to applicable state or local floodplain protection standards, and a brief description of steps to be taken to minimize potential harm to or within the floodplain (Figures 6-1 and 6-2).

10 C.F.R. §1022 states that the DOE will make a floodplain determination regarding the proposed action using Flood Insurance Rate Maps or the Flood Hazard Boundary Maps prepared by the Federal Emergency Management Agency of the Department of Housing and Urban Development. Where this information is not available, other land administering agencies with floodplain knowledge may provide the necessary information such as the Bureau of Land Management and the Soil Conservation Service.

Executive Order 11988: It is DOE's intent to incorporate floodplain requirements into applicable NEPA procedures. Executive Order 11988 requires federal agencies to consider the effects of proposed actions on floodplains. This order requires federal agencies to avoid to the extent possible adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development where there is a practicable alternative. Where no practicable alternative exists, proposed actions must include all practicable measures to minimize harm. DOE policy and procedures for compliance with Executive Order 11988 were established in 10 C.F.R. §1022, "Compliance with Floodplains/Wetlands Environmental Review Requirements" (Figures 6-1 and 6-2).

# MILESTONE CHART



PRIOR TO IMPLEMENTING A PROPOSED FLOODPLAIN ACTION, DOE SHALL ALLOW AT LEAST 15 DAYS OF PUBLIC REVIEW AFTER PUBLICATION OF THE STATEMENT OF FINDINGS.

## LEGEND FOR MILESTONE CHART AND FLOWCHART

- ASEH — ASSISTANT SECRETARY FOR ENVIRONMENT, SAFETY AND HEALTH
- RSD — RESPONSIBLE SUPERVISORY OFFICIAL, DOE ORDER 5440.1C
- F — FLOODPLAIN
- FIRMS — FEDERAL INSURANCE RATE MAPS
- FHBMS — FLOOD HAZARD BOUNDARY MAPS
- SCS — SOIL CONSERVATION SERVICE
- USGS — UNITED STATES GEOLOGICAL SURVEY
- NOI — NOTICE OF INTENT
- EIS — ENVIRONMENTAL IMPACT STATEMENT
- GC — GENERAL COUNSEL
- FONSI — FINDING OF NO SIGNIFICANT IMPACT
- FEIS — FINAL ENVIRONMENTAL IMPACT STATEMENT
- EA — ENVIRONMENTAL ASSESSMENT

FIGURE 6-1 FLOODPLAIN REGULATIONS

RSO shall consult:

- FIRMS
- FHBMs
- Land management agencies
- SCS Maps
- USGS Maps

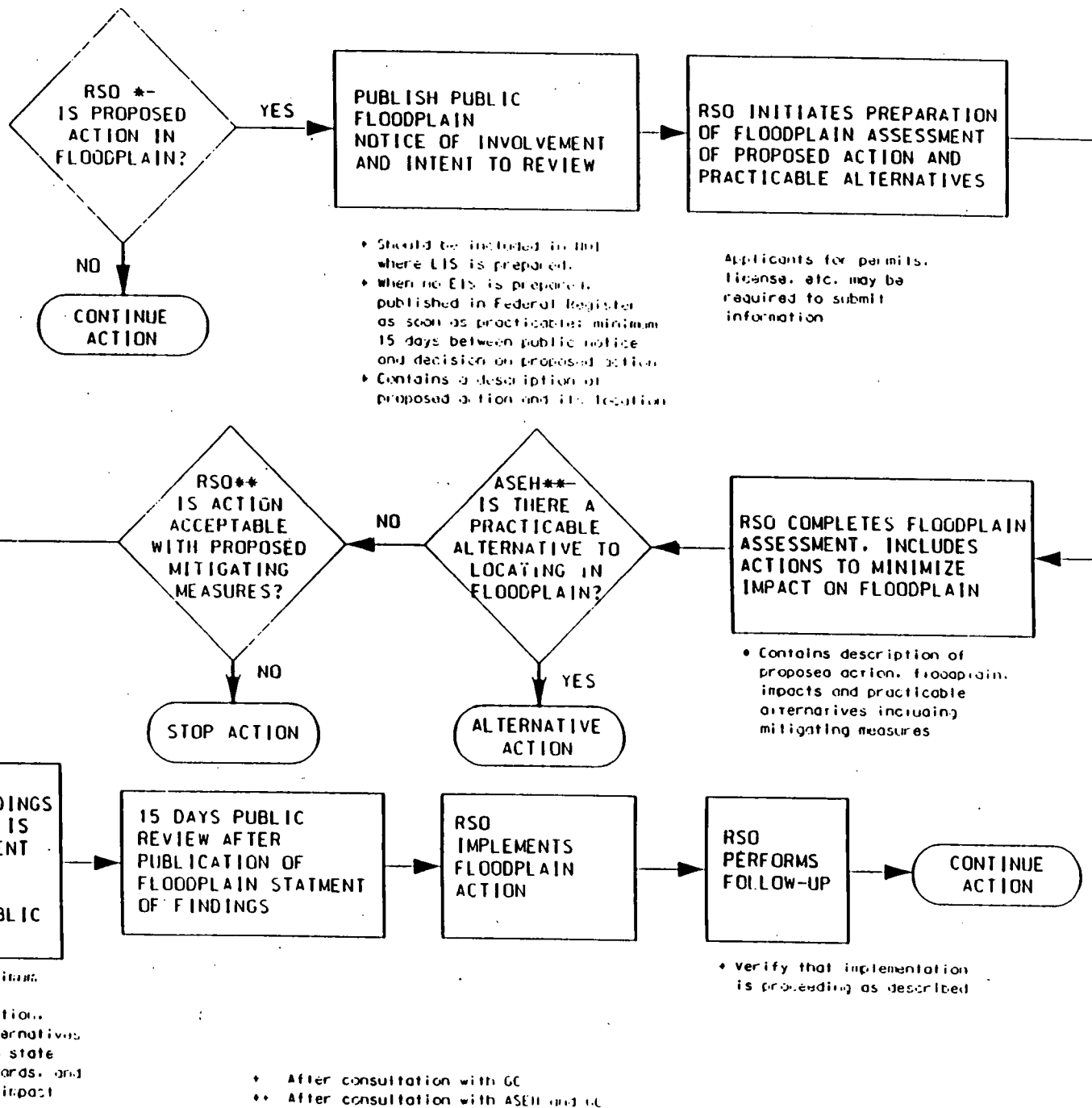


FIGURE 6-2 FLOODPLAIN REGULATIONS FLOWCHART

{This page left blank intentionally}

## 6.2 Description of Floodplains

Paddys Run Floodplains within the FEMP property are confined to the north-south corridor containing Paddys Run, which has also been designated as a water of the United States (Figure 6-3). Areas north of the main rail spur and south of Willey Road were not studied. For the Great Miami River, the 100- and 500-year extends west of the "Big Bend" area (Figure 6-4). The 100- and 500-year floodplain of the river also extends northward along Paddys Run from the confluence of the two waterways past the southern boundary of the FEMP properties (Figure 6-4).

A study by PARSONS (1993) examined the 100- and 500-year floodplain along Paddys Run. The results of this study predicted a 100-year flood flow of approximately 11,150 cubic feet per second. Elevations range from 542 feet (ft) MSL at the southern boundary of the floodplain to 567 ft MSL at the northern tip (Figure 6-3).

## 6.3 Management Objectives

All activities conducted at and around the FEMP site would be planned, implemented, and monitored in such a way as to avoid impacts to the floodplain if possible. All activities within the floodplain would be executed to lessen any impacts that may occur as a result of the proposed activity(s). If major impacts to the floodplain are unavoidable, mitigative measures will be examined.

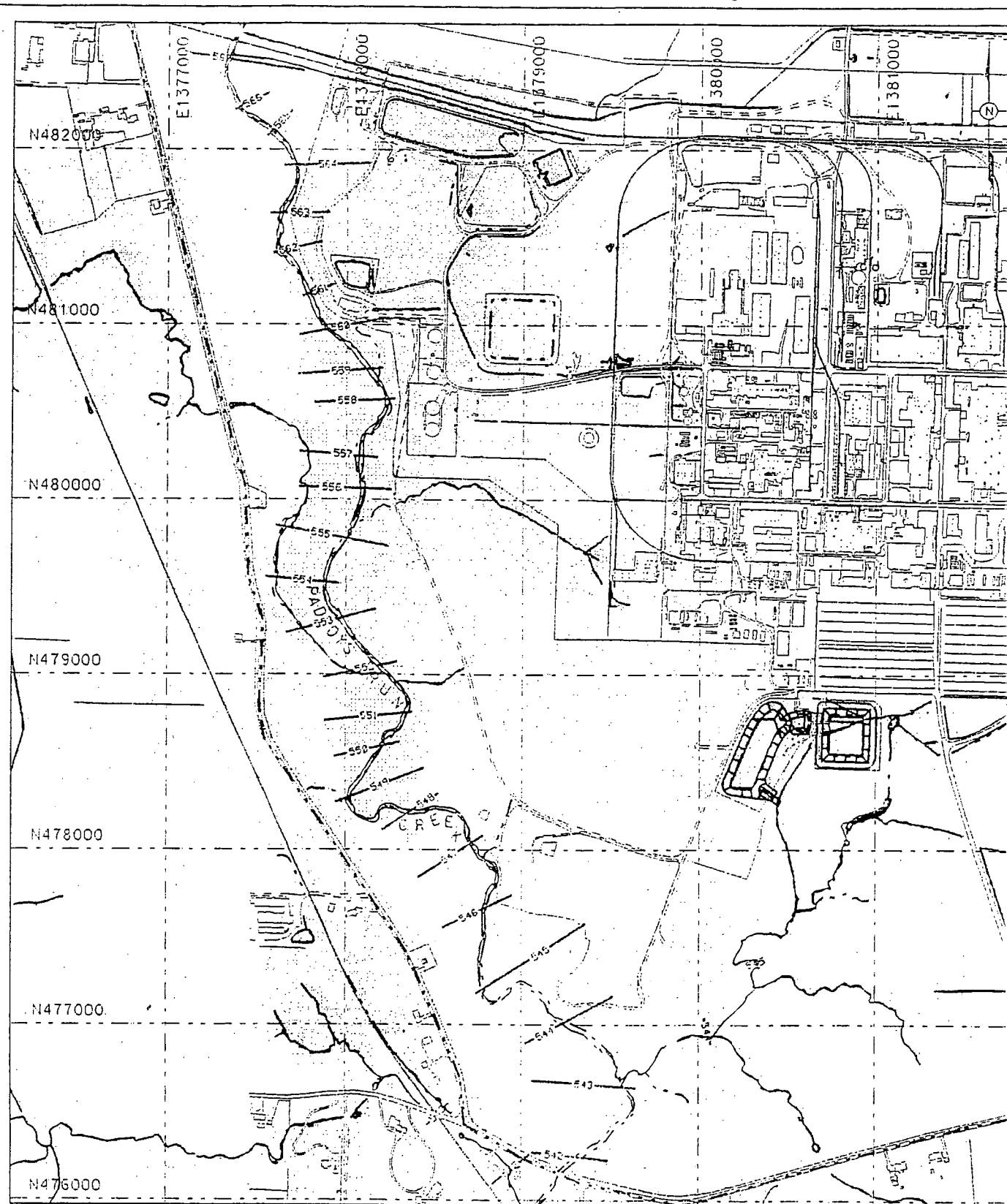
## 6.4 Management Plan

The following six components comprise a management plan for floodplain areas (the following six components may not necessarily occur in sequential order):

Map Floodplain Areas: A site map including all locations of floodplain areas at and around the FEMP site is made available to all personnel involved in the design, documentation, or evaluation of projects at the FEMP site. The map is updated concurrently with landscape changes. A 100- and 500-year Floodplain Boundary Map has been utilized for projects involving floodplains at the FEMP site.

{This page left blank intentionally}

RES2226 A FIDG-3.05M CRU-5 FEMUD/ENL/DRAFT R.1 DET 11/15/93

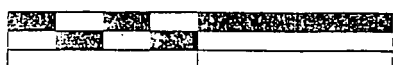


NOTES

LEGEND

- ~~~~~ STREAMS AND PONDS
- FEMP PROPERTY BOUNDARY
- 100 AND 500 YEAR FLOODPLAIN

SCALE



0 800 1600 FEET

FIGURE 6-3 PADDY'S RUN CREEK 100 AND 500 YEAR FLOODPLAIN

000066

{This page left blank intentionally}



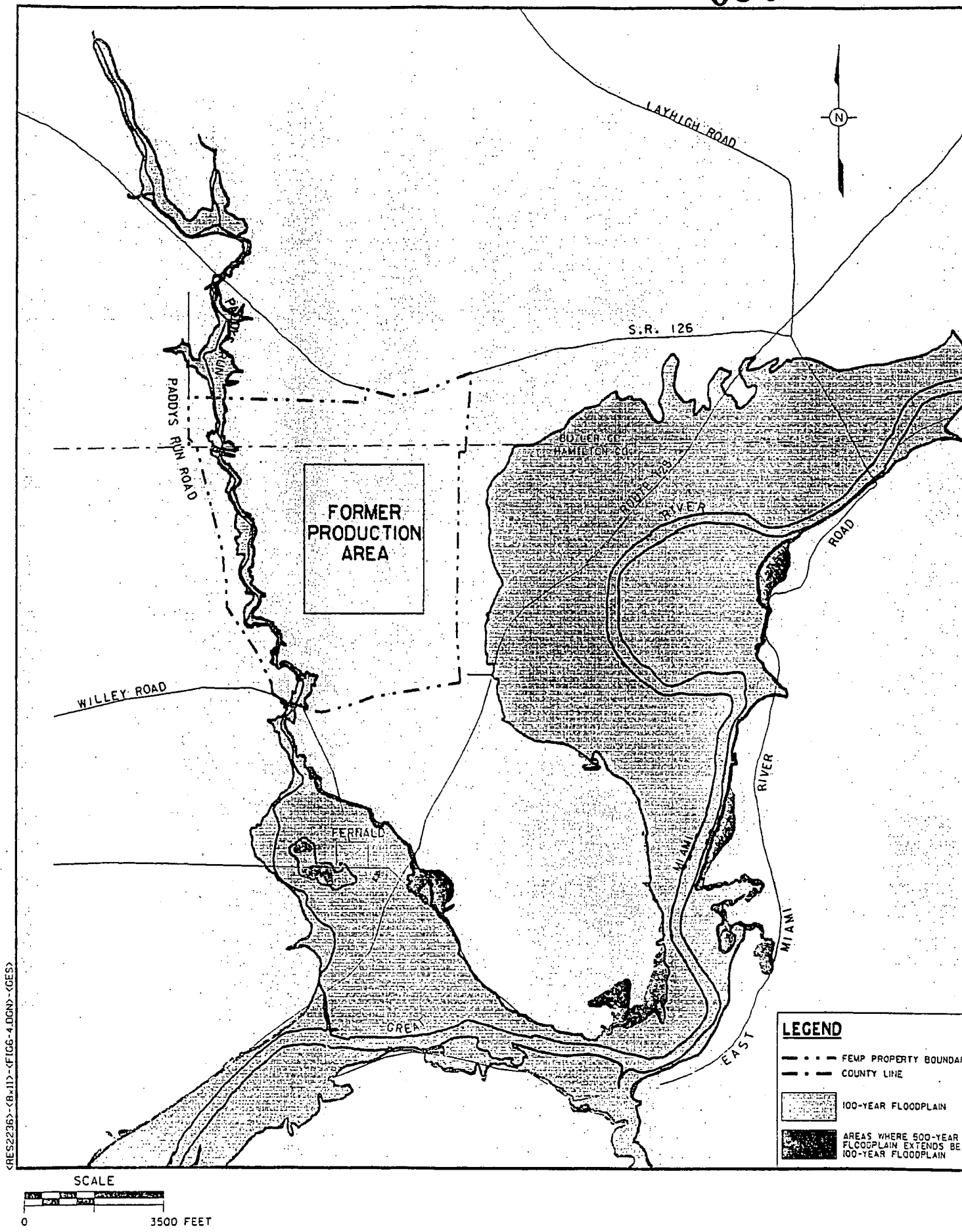


FIGURE 6-4 GREAT MIAMI RIVER AND PADDY'S RUN  
100-YEAR AND 500-YEAR FLOODPLAIN

000068

{This page left blank intentionally}

Promote Avoidance: Impacts to floodplain areas should be avoided whenever possible. Floodplain maps will be made accessible to site personnel so that remedial design or removal action work plans can be formulated utilizing impact avoidance.

Minimize Impacts: Minimization would lessen the severity of impacts that may result from proposed actions in floodplain areas by instituting Best Management Practices (e.g., silt fences and straw bales).

Prevent Potential Threat of Release: If a floodplain area is jeopardized by the potential threat of release, implement the necessary measures to protect the floodplain area, human health, and the environment. Note that a berm has been constructed within the 100- and 500-year floodplain of Paddys Run to control erosion that threatened the stability of the Inactive Flyash Pile and the potential release of flyash into the floodplain.

Mitigate or Enhance When Appropriate: If a project significantly impacts a floodplain, impacts would be offset by enhancing (i.e., regrading) the disturbed floodplain area to near original contours. Mitigation would occur only in extreme cases when significant changes in floodplain elevations are unavoidable and would be closely coordinated with the CRUs.

{This page left blank intentionally}

## 7.0 SOIL, AIR, AND WATER RESOURCES

### 7.1 Regulatory Drivers

The Clean Air Act (CAA), 42 U.S.C. §7401 et seq. (1977): This statute is designed to prevent and control air pollution from stationary and mobile sources. Enacted in 1970, amended in 1977, and expanded in 1990, the act empowers the EPA to set three types of national standards which affect stationary sources. These are (1) National Ambient Air Quality Standards (NAAQS); (2) New Source Performance Standards (NSPS); and (3) National Emissions Standards for Hazardous Air Pollutants (NESHAP). The states are responsible for developing State Implementation Plans, which through a combination of state statutes, regulations, and permits for individual sources, are designed to achieve the NAAQS. Specific regulations governing activities conducted at the FEMP include: 40 C.F.R. §61, Subpart H, which states emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem per year; 40 C.F.R. §61 and 40 C.F.R. §61; and Subpart Q, which states no source at a DOE facility shall emit more than 20 picoCuries per square meter-second (pCi/m<sup>2</sup>-s) of radon-222 as an average for the entire source during periods of storage and disposal.

Clean Water Act (CWA), 33 U.S.C. §1251: Revised from the amended Federal Water Pollution Control Act of 1972, this statute is designed to eliminate the discharge of pollutants into waters of the United States (including wetlands) from point sources without a permit and to provide "fishable" and "swimmable" water quality throughout the country. In addition, the overall objective of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." Specific regulations governing the activities performed at the FEMP include: 1) 40 C.F.R. §125.100, which states that the development and implementation of a Best Management Practices program must be designed to prevent the release of toxic or hazardous constituents to waters of the United States (NOTE: the development and implementation of a Best Management Plan program is also required as a condition of the FEMP National Pollutant Discharge Elimination System Permit.); 2) 10 C.F.R. §1022, which states that DOE actions in a floodplain or wetland must first evaluate the potential adverse effects those actions might have on the floodplain or wetland and consider the natural and beneficial values served by

the wetlands; 3) 33 C.F.R. Part 330, which states that the discharge of dredged or fill material into wetlands or waters of the United States must be conducted in compliance with the terms and conditions of the COE's NWP's as promulgated in Appendix A to 33 C.F.R. Part 330; 4) 40 C.F.R. §122.26 and state regulation OAC 3745-38, which state that storm water discharges associated with construction sites and industrial activities must be monitored and controlled; 5) state regulation OAC 3745-1-07, which states that all pollutants or combinations of pollutants shall not exceed, outside the mixing zone, the Numerical and Narrative Criteria for Aquatic Life Habitat and Water Supply Use Designations; and 6) state regulation OAC 3745-1-04, which states that all surface waters of the state shall be free from: (a) objectionable suspended soils; (b) floating debris, oil, and scum; (c) materials that create a nuisance; (d) toxic, harmful, or lethal substances; and (e) nutrients that create nuisance growth (Vig and Kraft 1990).

The Safe Drinking Water Act, 42 U.S.C. §300 *et seq.*: Revised from the Safe Drinking Water Act of 1974, this law requires the EPA to promulgate the National Primary Drinking Water Standards (NPDWS) for a variety of contaminants to protect levels in drinking water and for the protection of the sole-source aquifer. In general, NPDWS are structured to require initial compliance monitoring followed by a program of continued monitoring, either reduced or increased from the initial frequency, depending on whether or not a regulated contaminant has been detected in the water supply system.

## 7.2 Description of FEMP's Soil, Air, and Water Resources

The FEMP overlies a 2 to 3 mile-wide buried Pleistocene valley known as the New Haven Trough. This valley was eroded by the ancestral Ohio River during the Pleistocene Epoch and was subsequently filled with glacial outwash materials that were in turn covered by glacial overburden as glaciers advanced across the area. The outwash deposits under the FEMP are a part of the Great Miami Aquifer, which is a widely distributed buried valley aquifer.

Soil: The Butler County and Hamilton County Soil Surveys [U.S. Department of Agriculture (USDA) 1980, 1982] have 15 specific soil series or types mapped within the FEMP boundaries. The major soils are identified by the USDA as occurring in the vicinity of the FEMP. These include the Russell-Xenia-Wynn, Fincastle-Xenia-Wynn, and Fox-Genesee associations. Typically, these soils are light-colored,

acidic, and well-drained. Most of these soils developed from wind blown material (loess), except along river basins where the Fox-Genesee soils are of till origin. The soils are moderately high in productivity and are frequently used for growing cash crops and producing livestock.

Fifteen specific soil series types are delineated within the FEMP boundaries according to the Soil Surveys of Butler County and Hamilton County (USDA 1980). The Fincastle and Xenia silt loams cover large areas in the FEMP and to the west of the FEMP. These soils are light colored, medium acidic, and moderate, as is fertility and organic content (Table 7-1).

Soils exist within the FEMP boundaries that are classified as prime agricultural soils; however, there are no areas within the FEMP boundaries considered to be prime farmland. Prime farmland, as defined by the U.S. Department of Agriculture, is land best suited for producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to sustain high crop yields if acceptable farming methods are used. Under the Farmland Policy Protection Act of 1981, 7 C.F.R. 658, prime farmland does not include land already in or committed to urban development. Land designated as prime farmland must not have more than 30 structures per a 40 acre area and can not be designated as commercial or industrial areas. Soils exist within the FEMP property boundaries that meet the requirements for prime agricultural soils as described by the U.S. Department of Agriculture; however, the land use on the FEMP property does not meet the requirements of prime farmland as described by the Farmland Policy Protection Act (Figure 7-1).

Meteorology, Climatology, and Air Quality: The meteorology of the FEMP site is typical of conditions throughout southwestern Ohio, but surface winds are often affected by the local terrain. The Great Miami River Valley's ridges near the FEMP property are the predominant features that influence wind patterns at the site.

The regional climate is defined as continental, with temperatures ranging from a monthly average of 29.2°F in January to 75.7°F in July. The average number of days per year with a minimum temperature of 32°F or less is 109 days, and the average number of days per year with a maximum temperature of 90°F or greater is 20 days. The highest precipitation occurs during the spring and early summer and the greatest snow fall usually occurs in January.

{This page left blank intentionally}

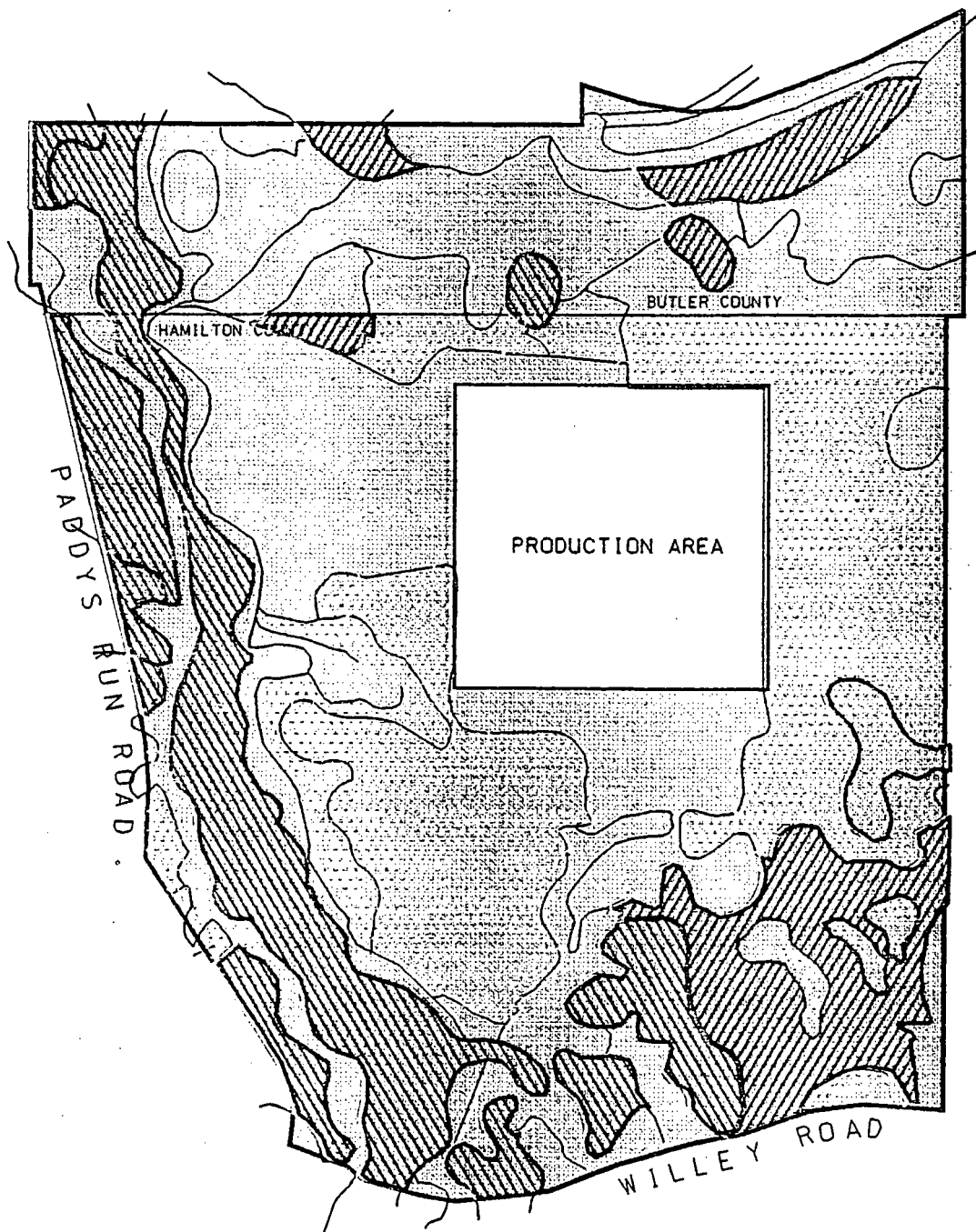


TABLE 7-1  
SOIL SERIES, SLOPES, AND PRIME FARMLAND SOIL CLASSIFICATIONS

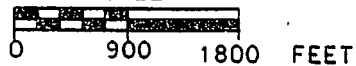
Symbol	Soil Series	Slopes (%)	Prime/Non-Prime Agricultural
DaB	Dana silt loam	2-6	Prime
EcE2	Eden silty clay loam	15-25	Non-Prime
EcF2	Eden silty clay loam	25-50	Non-Prime
FcA	Fincastle silt loam	0-2	Non-Prime
FdA	Fincastle silt loam	0-2	Non-Prime
FeA	Fencastle-urban land complex	0-2	Non-Prime
FoA	Fox loam	0-2	Prime
Gn	Genesee loam	0-2	Prime
HeF	Hennepin silt loam	35-60	Non-Prime
HoA	Henshaw silt loam	0-2	Prime
MaB	Markland silty clay loam	2-6	Prime
MaC2	Markland silty clay loam	6-12	Non-Prime
McA	Martinsville silt loam	0-2	Prime
MnC2	Miamian silt loams	8-15, eroded	Non-Prime
MoE2	Miamian-Hennepin silt loams	25-35, eroded	Non-Prime
MsC2	Miamian-Russell silt loams	2-6	Non-Prime
MsD2	Miamian-Russell silt loams	12-18, eroded	Non-Prime
Ra	Ragsdale silty clay loam	level	Non-Prime
RdA	Raub silt loma	0-2	Non-Prime
RvB	Russell-Miamian silt loam	0-2	Non-Prime
RwB2	Russell silt loam	3-8, eroded	Non-Prime
UnA	Uniontown silt loam	0-2	Non-Prime
UnB	Uniontown silt loam	2-6	Non-Prime
XeB	Xenia silt loam	2-6	Non-Prime
XeB2	Xenia silt loam	2-6	Non-Prime
XfA	Xenia silt loam	0-2	Prime
XfB2	Xenia silt loma	0-2, eroded	Prime

Sources: SWCR (1993)

{This page left blank intentionally}

SOURCE:

USDA (1980, 1982)

SCALELEGEND:

PRIME AGRICULTURAL SOILS

PRODUCTION AREA

FIGURE 7-1 PRIME AGRICULTURAL SOILS WITHIN FEMP BOUNDARIES

000078

{This page left blank intentionally}

Uranium and radon are the principle present-day airborne constituents of potential concern and are extensively monitored by the FEMP. Radionuclide emissions have been decreasing since production ceased in 1988. With respect to NAAQS, the air quality in the vicinity of the FEMP is generally regarded as "good". With regard to regulated air pollutants under the CAA, dispersion modeling indicates that concentrations in recent years are well within the limits set by the State of Ohio.

Groundwater: The Great Miami Aquifer is the principle aquifer within the FEMP boundary. The underground valley in which it occurs varies in width from about one-half mile to over two miles. Having a U-shaped cross section with a broad relatively flat bottom and steep valley walls, the valley is filled with extensive deposits of sand and gravel ranging in thickness from 39.6 to 60.9 meters (120 to 200 ft) in the valley to only several feet along the valley walls. A relatively continuous low permeable clay interbed ranging from about 1.5 to 6.1 meters (5 to 20 ft) in thickness occurs beneath much of the FEMP property. The clay interbed occurs approximately 39.6 meters (130 ft) below the land surface and, where present, divides the aquifer into upper and lower sand and gravel units (DOE 1993).

The heterogeneous nature of the glacial overburden makes the interpretation of groundwater flow difficult. Clays found within the overburden exhibit confining conditions, whereas silts, sands, and gravel exhibit unconfined conditions. Most of the silt, sand, and gravel found in the glacial overburden are surrounded by clay-rich deposits. Consequently, the clay prevents water from rapidly migrating. The presence of a perched groundwater system is the first line of evidence that the till at the base of the glacial overburden retards the downward movement of groundwater. The fact that the glacial overburden provides a true perched groundwater condition is demonstrated by the presence of approximately 20 feet of unsaturated sand and gravel between the base of the saturated glacial overburden and the water table in the Great Miami River Aquifer.

The principle sources of groundwater recharge on the FEMP site are through direct precipitation, stream infiltration, and bedrock. Infiltration of rainfall and snowmelt is the dominant regional source groundwater recharge, providing approximately 2,157,450 liters (570,000 gallons) per day per square mile, or roughly 30.4 centimeters (12 inches) per year to the water table of the aquifer (DOE 1993). Once the water reaches the aquifer, the groundwater underlying the northern portion of the property flows east towards the Great Miami River. Groundwater underlying the southern and southwestern portions of the property flows southeast through the buried valley. Near the southwest corner of the property,

a groundwater component from the west is also present. This causes the recharge from certain reaches of Paddys Run to flow east-southeast until the regional southern component of flow is encountered.

Surface Water: Maximum elevation along the northern boundary of the FEMP property is a little more than 213.3 meters (700 feet) above MSL. The former Production Area and Waste Storage Area rest on a relatively level plain at about 176.7 meters (580 feet) MSL. The FEMP is located within the Great Miami River drainage basin but above the river's present day floodplain. The Great Miami River flows within 1.2 km (0.75 mi) of the property's eastern boundary and ends in the Ohio River approximately 38.6 km (24 mi) from the main effluent line discharge point, which is located at river mile (RM) 24.1. Tributaries to the Great Miami River in the region include Four Mile Creek at RM 38.4, approximately 14.0 river miles above the FEMP; Banklick Creek located just south of RM 28; Owl Creek located at RM 22.0; and Blue Rock Creek, which enters the river at RM 21.0. Paddys Run, which flows along the property's western boundary, joins the Great Miami River at approximately RM 19.5, and Taylor Creek enters the river at approximately RM 14.4. The Whitewater River combines with the Great Miami River at RM 6.0.

Surface waters on and adjacent to the FEMP property are the SSOD, Paddys Run, and the Great Miami River (see Figure 7-2). The SSOD originates south of the former Production Area, flows southwest across the southern portion of the property, and enters Paddys Run near the southwest corner of the property. Much of the stream bottom of this drainage course, which collects runoff from an area east of the former Production Area and storm water retention basin overflow, is composed of sand and gravel and is highly permeable. Paddys Run originates north of the FEMP property, flows southward along the western boundary of the facility, and enters the Great Miami River approximately 2.4 km (1.5 mi) south of the southwest corner of the site property. The stream is approximately 14.1 km (8.8 mi) long and drains an area of approximately 25.4 square km (15.8 square mi).

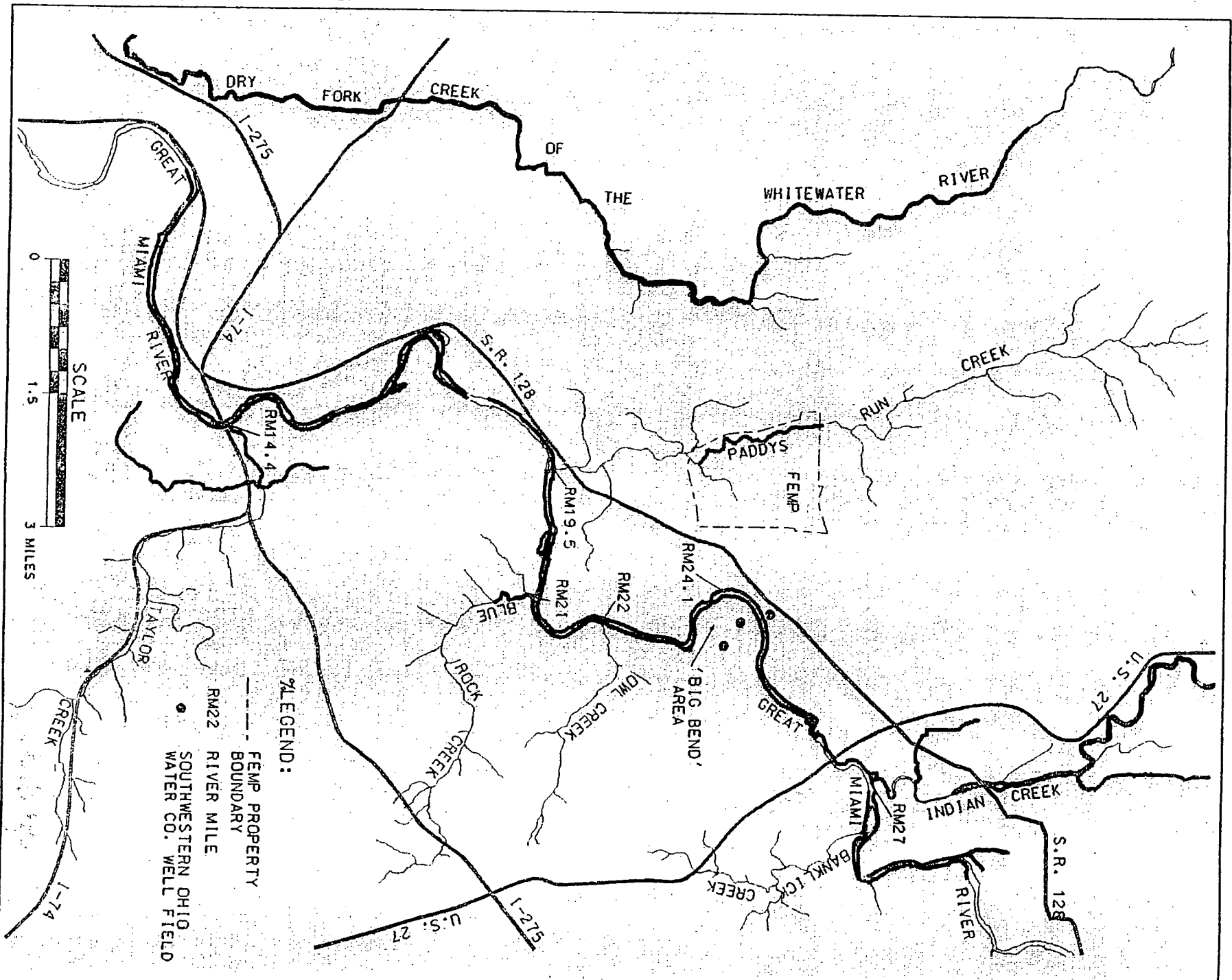


FIGURE 7-2. REGIONAL SURFACE WATERS 000082

6364

{This page left blank intentionally}



### 7.3 Management Objectives

Impact Avoidance: Management activities will be employed to protect soil, air, and water resources at the FEMP site and will be implemented on a project by project basis. The overall objective will be to minimize the impacts to these natural resources. The following are initial objectives to be employed to avoid impacts.

- Protect the soil, air, and water to enhance the quality and productivity of site activities.
- Identify areas with a high probability of erosion.
- Identify activities most likely to generate fugitive dust.
- Identify point and non-point sources of water pollution that have an effect on the quality of surface water and groundwater.

### 7.4 Management Plan

Site Characterization and Environmental Monitoring: A number of investigations have been conducted in an attempt to characterize the volume of waste and extent of contamination at and around the FEMP site. Required by DOE Order 5400.1, routine environmental monitoring of soil, air, surface water, and groundwater is currently being conducted at the FEMP site. These actions are taken to determine if remedial activities are meeting federal and state standards regarding the management of both radiological and nonradiological waste.

Management of Contaminated Soil and Other Hazardous Materials: In addition to work practices designed to protect the soil, air, and water resources, management of construction areas, borrow pits, spoil piles, and waste site cleaners will be employed through the following engineering controls:

- Precipitation running onto an affected area of the site can cause "clean" areas to become contaminated. This will be prevented by installing structures around contaminated surfaces and tarping clean and contaminated spoil piles and other clean and contaminated

materials that have the potential to erode. Personnel are encouraged to avoid placing open containers where precipitation can enter them and become contaminated. Empty buckets, pails, and drums will be inverted, and covers will be placed over openings in tanks and vessels.

- Runoff of contaminated and clean soil areas can cause significant sedimentation in local creeks and streams. This will be avoided through proper management of construction areas, borrow pits, and spoil piles.
- High winds have the potential to cause contaminated and nuisance dust to become airborne and decrease the quality of the air. Consequently, air quality will be maintained through tarping spoil piles (contaminated or clean); tarping other construction materials; and applying wetting materials by mechanical or physical means. For example, this would include backhoe work and sweeping horizontal surfaces that have the potential of creating airborne particulates. Proper filtration equipment (e.g., High Efficiency Particulate Air filters) and wetting activities will be utilized when practicable to reduce emissions of fugitive dust, hazardous vapors, and fumes. Depending on the activity, in many cases, emissions will be monitored to better assess air quality. Proper housekeeping will maintain the quality of the air through proper storage and handling of natural and man-made materials used in remedial activities.
- Unauthorized and unregulated transfers of contaminated waste materials can lead to the spread of contamination and result in regulatory noncompliance related to improper storage. For this reason, the FEMP site has developed procedures that regulate these transfers and require strict adherence by all personnel.

Promotion of Impact Avoidance: Protecting the natural resources at the FEMP site is the responsibility of each DOE and FERMCO employee. All mitigative measures and engineering controls mentioned above are consistent with those discussed in the operable unit feasibility study reports and will be factored into the remedial design/remedial action, and removal action workplans. Ultimately, responsibility rests on "front-line" project engineers and managers who are closest to the remedial activities. Health and safety plans, work permits, and safe work practices will aid project engineers and managers in accomplishing remedial design requirements while at the same time fostering protection of soil, air, and water resources.

## 8.0 CONCLUSION

DOE and FERMCO recognize that protection and management of natural resources are an integral part of the FEMP site mission. The management and protection of natural resources at the FEMP site are driven by DOE Orders 5400.1 and 4300.1C, NEPA, and numerous other resource specific regulations. The implementation of the NRMP will be integrated with ongoing CERCLA, NEPA, and Natural Resource Trustee activities at the site. Overall responsibility for implementation of the NRMP will lie with FERMCO's NRM Department in close coordination with the CRUs and other groups. This NRMP will be implemented as long as DOE retains ownership of the FEMP property and will be updated a minimum of every two years.

A significant part of the implementation of this plan will involve awareness activities and field surveillances carried out primarily by the NRM Department as part of the ongoing NEPA Compliance program at the site. Awareness activities (e.g., marking wetlands in the field and cultural resource awareness training) will be implemented in an effort to minimize impacts to the site's natural resources. Field surveillances will be carried out on a project by project basis to ensure that management activities are being appropriately implemented. Field surveillances will also be conducted on a routine basis (e.g., annually) to monitor the activities' effects upon natural resources and the effectiveness of management activities.

An additional aspect of the plan's implementation will be the contracting of independent, unbiased firms to conduct field surveys of specific resources (e.g., threatened and endangered species, cultural resources, and wetlands). Specialty contractors will be obtained in cases where corporate personnel do not exist to conduct the survey or it is in the best interest of the FEMP to have a neutral evaluation or survey.

In cases where a project will disturb a wetland, floodplain, threatened and endangered species, or cultural resource, it may be appropriate to mitigate the loss of these natural resources. Significant losses of these resources would most likely occur as a result of the Operable Units 1 through 5 remedial activities. In cases where the remedial activities would result in a significant loss of a resource, the magnitude of the

loss and the proposed mitigation commitment would be identified as part of the RI/FS-NEPA evaluations conducted for that operable unit.

Implementation of this NRMP will provide a mechanism to achieve and maintain compliance with numerous environmental regulations (e.g., Endangered Species Act and National Historic Preservation Act). In addition, the NRMP will be a valuable management tool throughout the RI/FS, NEPA Compliance, remedial design/remedial action (RD/RA), and Natural Resource Trusteeship processes at the site.

## 9.0 LIST OF CONTRIBUTORS

Rebecca J. Bixby, Technical/Program Specialist II  
Fernald Environmental Restoration Management Corp.  
M.S., Biological Sciences  
University of Cincinnati

Calvin J. Brown, Principal Technical/Program Specialist  
Fernald Environmental Restoration Management Corp.  
MBA  
Harvard University

John J. Homer, Technical/Program Specialist II  
Fernald Environmental Restoration Management Corp.  
B.A., Biology  
Augustana College

Jennifer K. Mailander, Esq., Technical/Program Specialist III  
Fernald Environmental Restoration Management Corp.  
J.D.  
University of Dayton School of Law

Marc E. Nelson  
Fernald Environmental Restoration Management Corp.  
B.S., Geology  
Indiana University

Joseph E. Schomaker, Historian/Cultural Resource Coordinator  
Fernald Environmental Restoration Management Corp.

Craig A. Straub, Technical/Program Specialist III  
Fernald Environmental Restoration Management Corp.  
M.S., Environmental Science  
Ball State University

Alicia Taylor, Technical/Program Specialist II  
Fernald Environmental Restoration Management Corp.  
B.A., Communications  
University of Missouri

Thomas W. Underwood, Technical/Program Specialist II  
Fernald Environmental Restoration Management Corp.  
M.S., Environmental Studies  
Southern Illinois University at Edwardsville

Angela S. Weisgerber, Technical/Program Specialist II  
Fernald Environmental Restoration Management Corp.  
B.A., English Literature  
University of Cincinnati

Eric Woods, Manager  
Natural Resource Management (NRM)  
Fernald Environmental Restoration Management Corp.  
M.S., Environmental Science  
Ball State University

## 10.0 REFERENCES

Advisory Council on Historic Preservation and the GAS Interagency Training Center, 1993, Introduction to Federal Projects and Historic Preservation Law, Participants Desk Reference.

Anderson, D. M., 1982, "Plant Communities of Ohio," unpublished manuscript, Ohio Department of Natural Resources, Division of Natural Area and Preserves, Columbus, OH.

Bailey, R., 1978, "Ecoregions of the United States," U.S. Forest Service, Ogden, UT.

Britton, N. L. and A. Brown, 1936, "Illustrated Flora of the Northern United States, Canada and the British Possessions from Newfoundland to the Parallel of the Southern Boundary of Virginia and from the Atlantic Ocean, Westward to the 102nd Meridian," 2nd edition revised, Volumes I-III, New York, Botanical Garden, NY.

Converse, R. N., 1973, Ohio Flint Types, Archaeological Society of Ohio, [need place of publication].

Davis, J. G., 1994, "Report on the Status of the Cave Salamander (Eurycea lucifuga) at the Fernald Environmental Management Project," prepared for FERMCO, Cincinnati, Ohio.

Ebasco Environmental, 1993, "Wetlands Delineation Report of the FEMP," FERMCO, Cincinnati, Ohio, prepared for the U. S. Dept. of Energy, Fernald Field Office, Fernald, OH.

Environmental Laboratory, 1987, "Corps of Engineers Wetlands Delineation Manual", Technical Report Y-87-1, prepared for the U. S. Army Corps of Engineers, U. S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Facemire, C. F., S. I. Guttman, D. R. Osborne, and R. H. Sperger, 1990, "Biological and Ecological Site Characterization of the Feed Materials Production Center," FMPC-SUB 018, prepared for the U.S. Dept. of Energy, Fernald Field Office, Fernald, OH.

Federal Register (FR), March 7, 1979, Compliance with Floodplain/Wetlands Environmental Review Requirements, 10 C.F.R. Part 1022

FERMCO, 1992, "Cultural Resources Management Plan, Fernald Environmental Management Project (Restricted)," prepared for the U. S. Dept. of Energy, Fernald Field Office, Fernald, OH.

Miller, M. C., R. J. Bixby, J. Engman, L. Ross, and L. Stocker, 1993, "Electrofishing Survey of the Great Miami River, Annual Report, Fernald Environmental Management Project," prepared for FERMCO, Cincinnati, OH.

PARSONS, 1993, "100- and 500-Year Floodplain Determination Sitewide," Fernald Environmental Management Project, Cincinnati, Ohio, prepared for the U.S. Dept. of Energy, Fernald Field Office, Fernald, OH.

St. John, F. L., 1993, Report on the Status of the Sloan's Crayfish (Orconectes sloanii Bundy) at the Fernald Environmental Management Project, prepared for FERMCO, Cincinnati, Ohio.

Starr, S. F., 1960, "The Archaeology of Hamilton, County, Ohio," Journal of the Cincinnati Society of Natural History, Volume XXIII, No. 1, Cincinnati, Ohio.

Trautman, M. B., 1981, "The Fishes of Ohio," Ohio State University Press, Columbus, OH, 782 pp.

U. S. Dept. of Agriculture, 1980, "Soil Survey of Butler County OH," Soil Conservation Service, Ohio Dept. of Natural Resources, Division of Lands and Soil, and Ohio Agricultural Research and Development Center, n.p.

U. S. Dept. of Agriculture, 1982, "Soil Survey of Butler County Ohio," Soil Conservation Service, Ohio Dept. of Natural Resources, Division of Lands and Soil, and Ohio Agricultural Research and Development Center.

U. S. Dept. of Energy, 1993, "Site-Wide Characterization Report, Fernald Site, Fernald, Ohio, Remedial Investigation and Feasibility Study, Final," U. S. Dept. of Energy, Fernald Field Office, Fernald, OH.

U.S. Environmental Protection Agency, September 1976, "Crayfish (*Astacidae*) of North and Middle America," Water Pollution Control Research Series 10850, U. S. EPA, Cincinnati, OH.

U. S. Geological Survey, 1990, "Water Quality Data Collected for National Stream Quality Accounting Network," data printout for Gauge Number 03274600, Great Miami River at New Baltimore, Ohio for 1974 to 1982, U. S. Geological Survey, Washington, DC.

Vig, N. J. and M. E. Kraft, 1990, "Environmental Policy in the 1990s," Congressional Quarterly Inc., Congressional Quarterly Press, Washington, DC.

William, S. R. and R. Stephen, 1945, Saga of Paddys Run, Miami University, Oxford, OH.

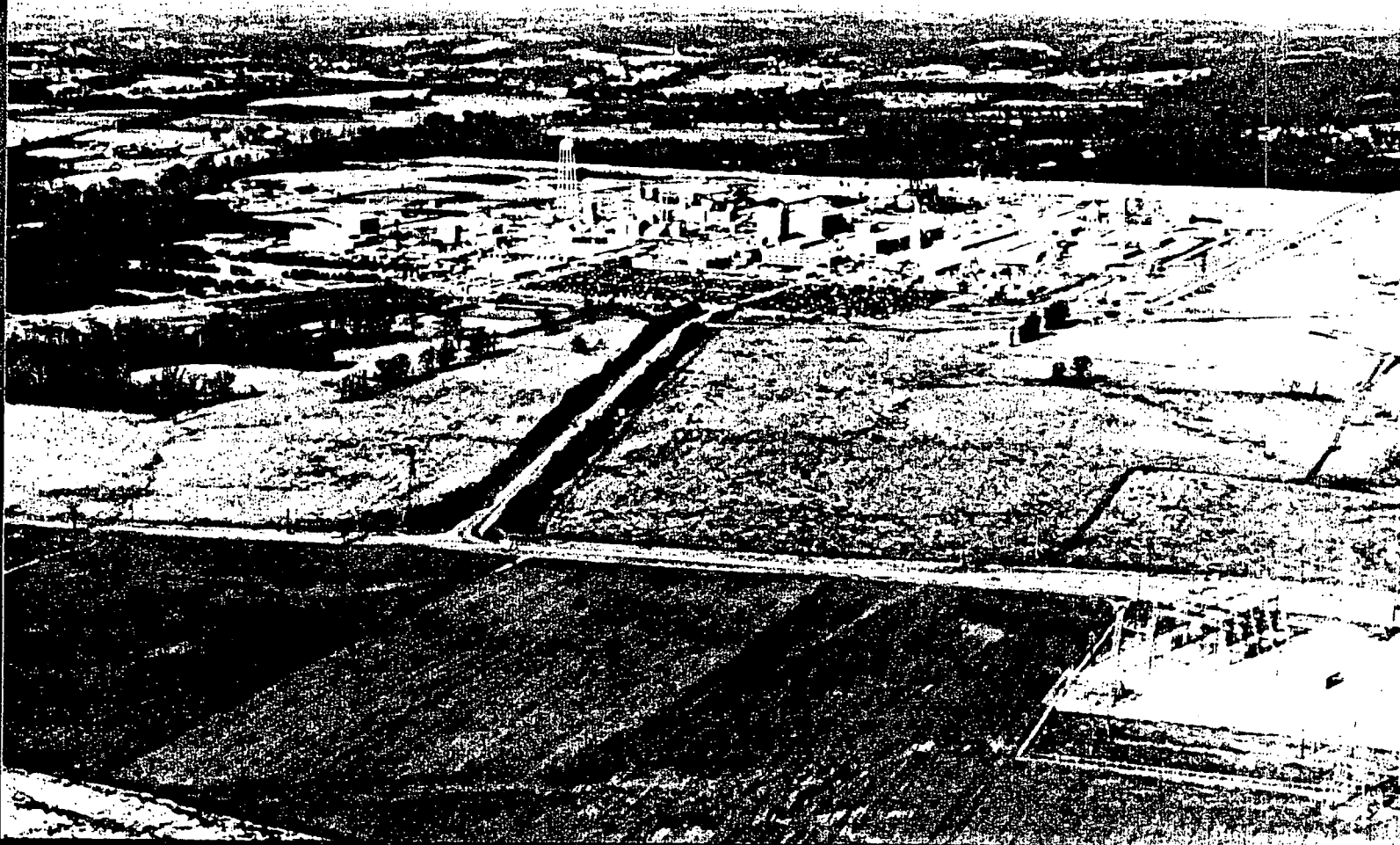


6364

FEMP-NRMP-4  
November 1994

Appendix A

Photographs of FEMP Natural Resources



Aerial of the FEMP Site, February, 1993.

6364

000093

000094



Naturally-Occurring Swale (Wetland Area) with a Broad-Leaf Cattail (*Typha latifolia*).

6364

000095



6364

Aerial of North Mid Successional Woodland/Riparian Area Which Includes the American Elm (*Ulmus americana*) and Eastern Cottonwood (*Populus deltoides*).



Mid Successional Woodland Includes the American Elm (*Ulmus americana*).

6364

000036

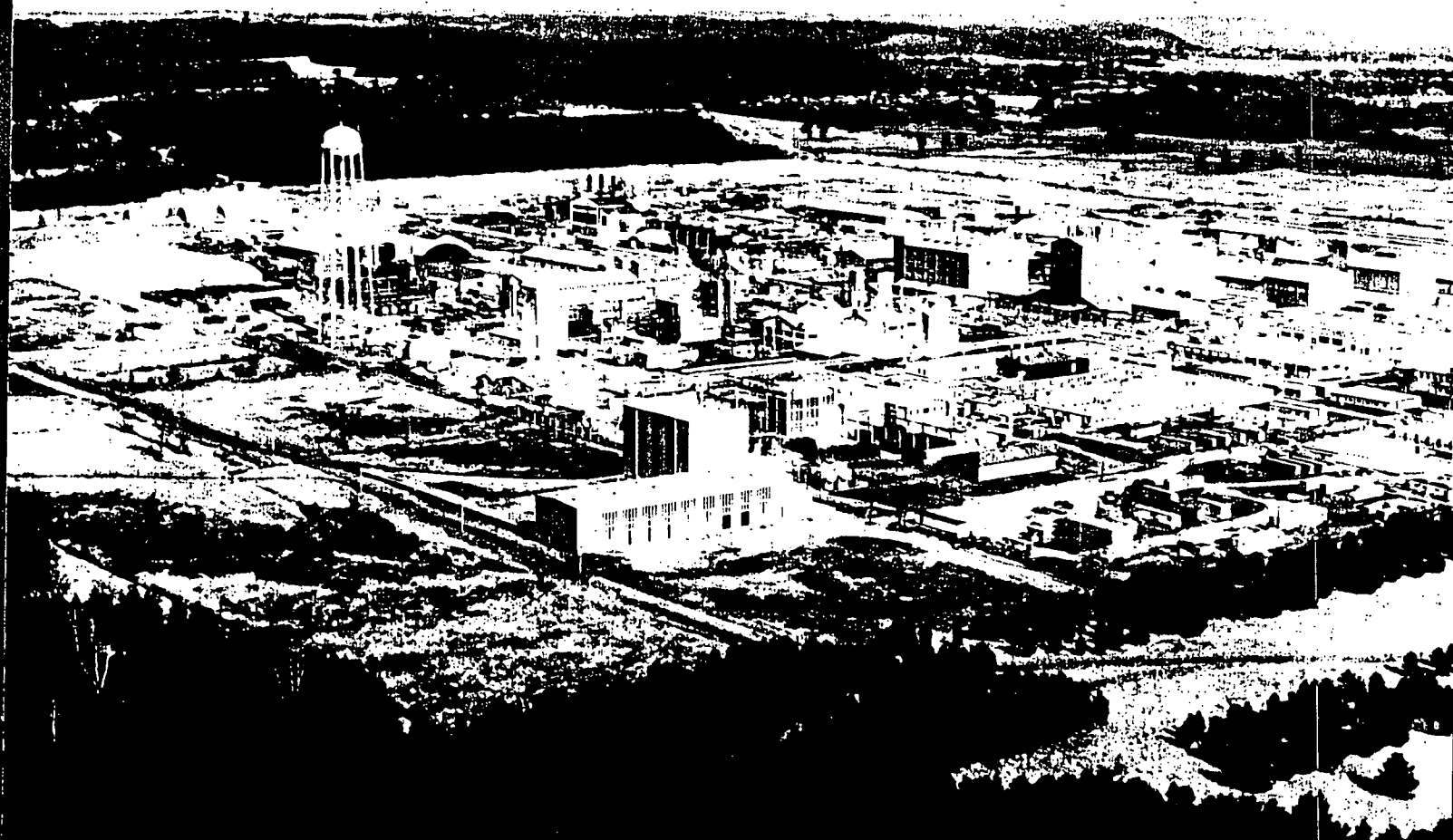


Grassland with Queen Anne's Lace (*Daucus carota*), Red Fescue (*Festuca rubra*), Kentucky Bluegrass (*Poa pratensis*), Orchard Grass (*Dactylis glomerata*), and Red Clover (*Trifolium pratense*).

6364

000097

000098



Southern and Northern Pine Plantation.

6364



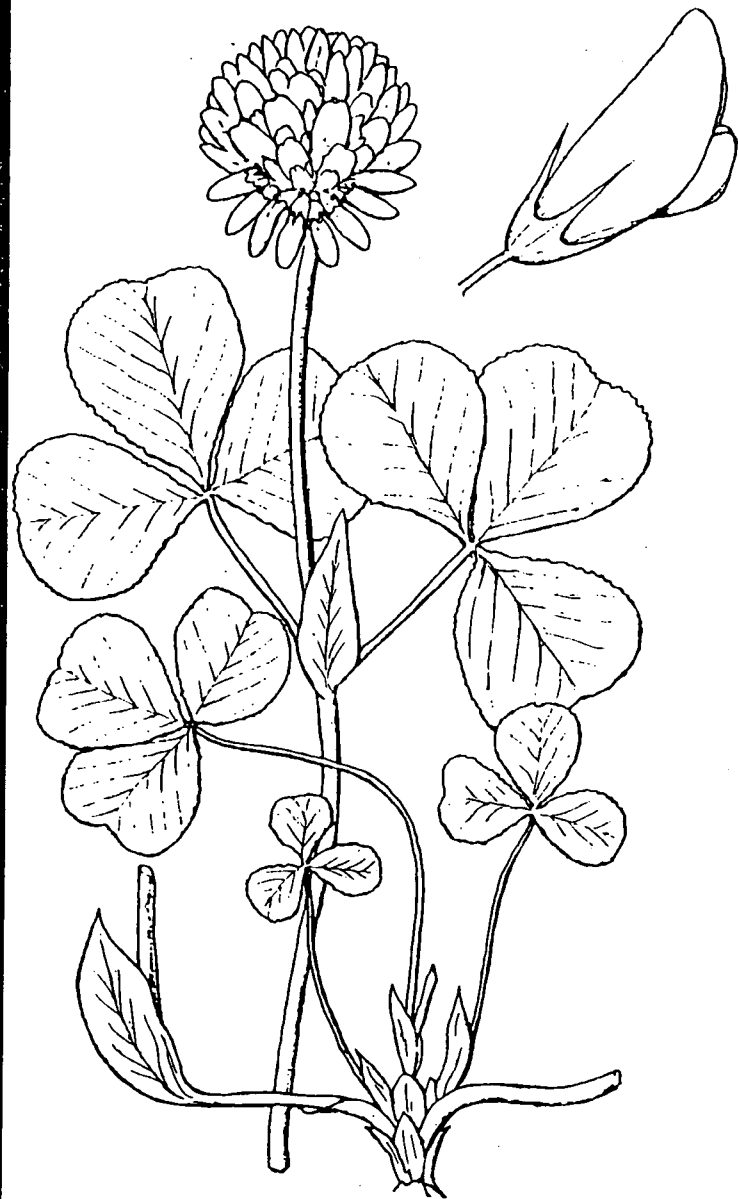
Northern Pine Plantation Contains White Pine (*Pinus strobus*) and Austrian Pine (*Pinus nigra*).





Early Successional Woodland Contains the White Ash (*Fraxinus americana*) and American Elm (*Ulmus americana*).

000101

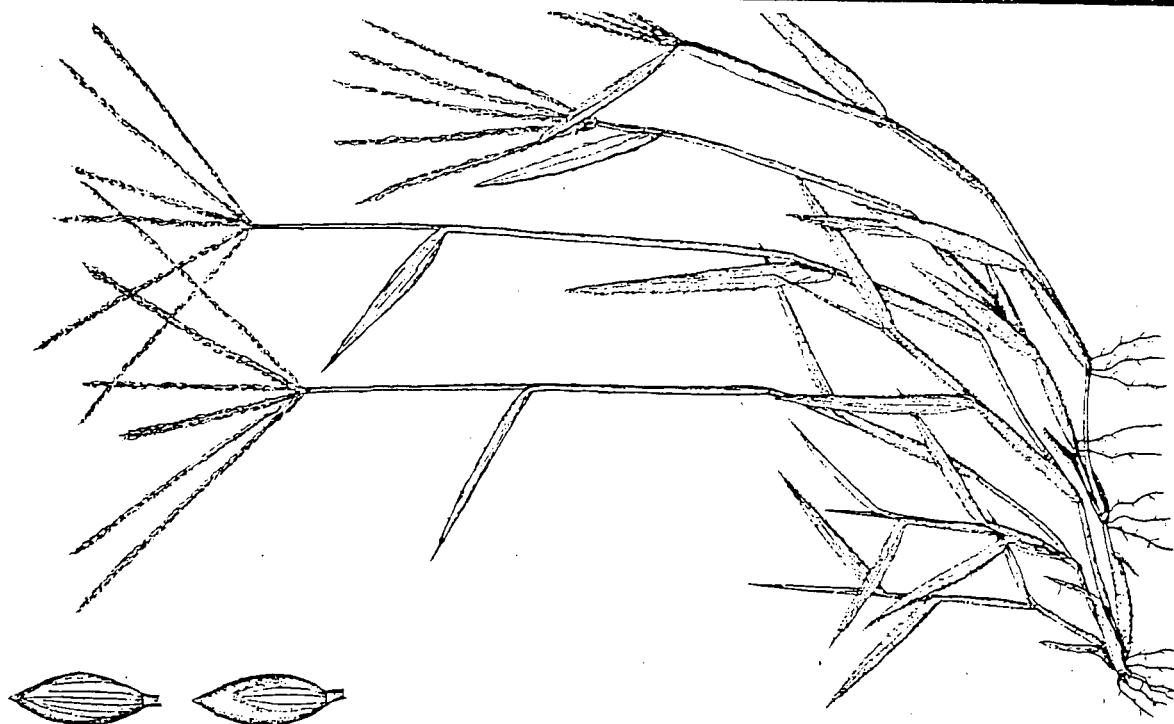


Running Buffalo Clover  
(*Trifolium stoloniferum*).



Spring Coral-Root  
(*Corallorhiza wisteriana*).

6364



Slender Fingergrass  
(*Digitaria filiformis*).



Mountain Blindweed  
(*Polygonum ciliolobum*).



Dorsal View of Generalized Male Crayfish.  
(See St. John 1993 for Additional Details).

6364

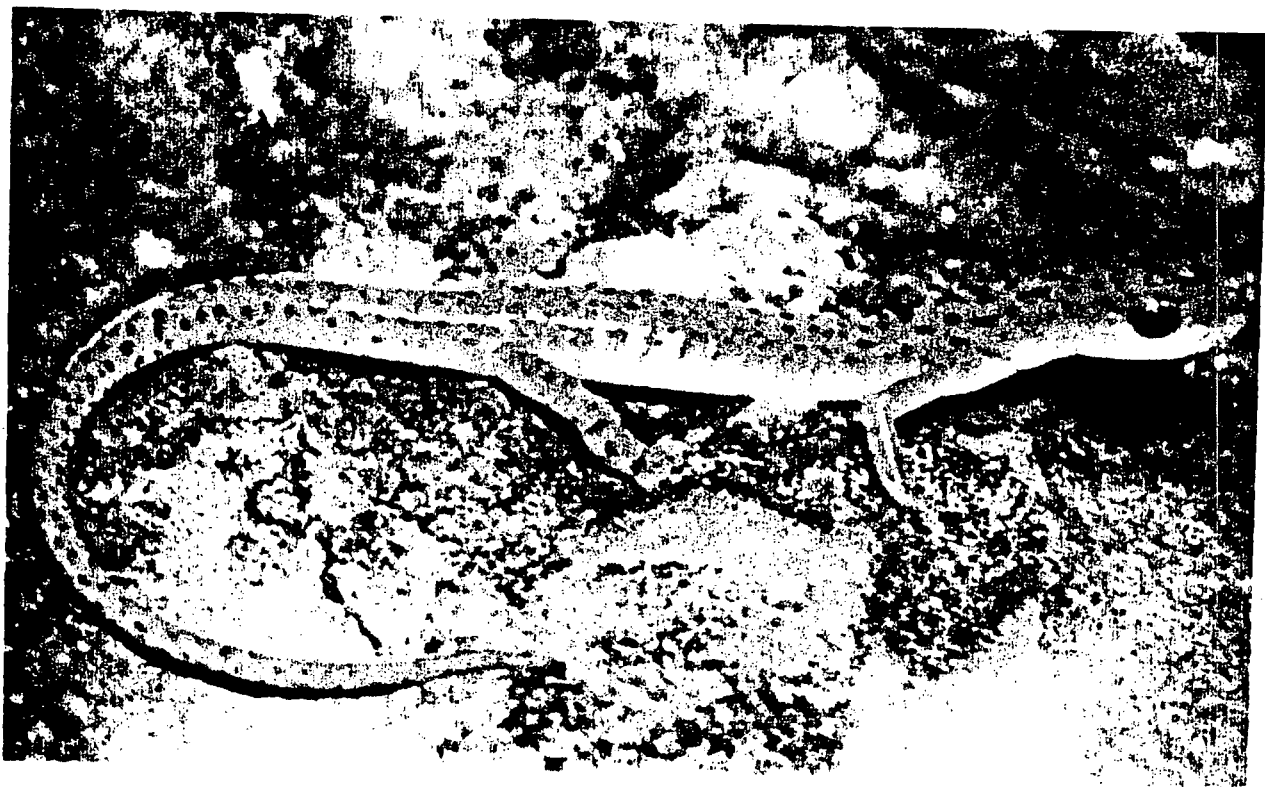
000103



Indiana Bat (*Myotis sodallii*)

6364

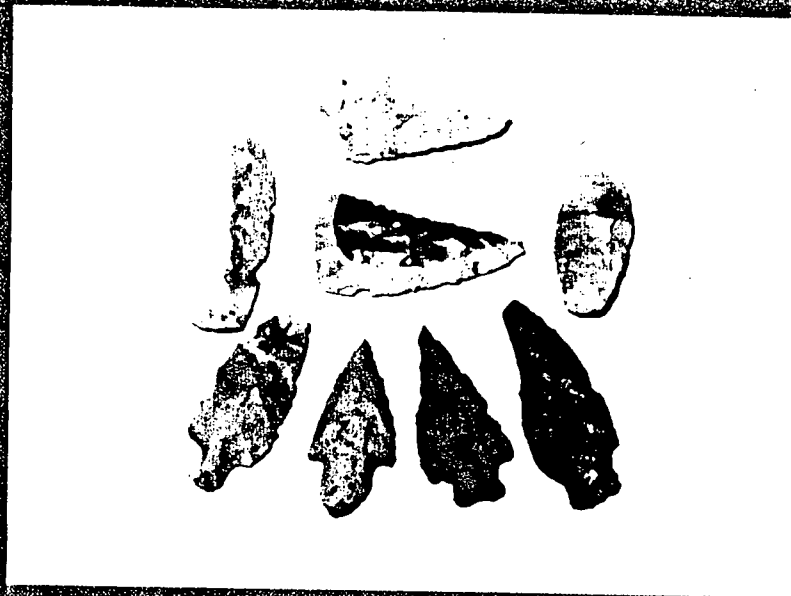
000104



Cave Salamander (*Eurycea lucifuga*).

6364

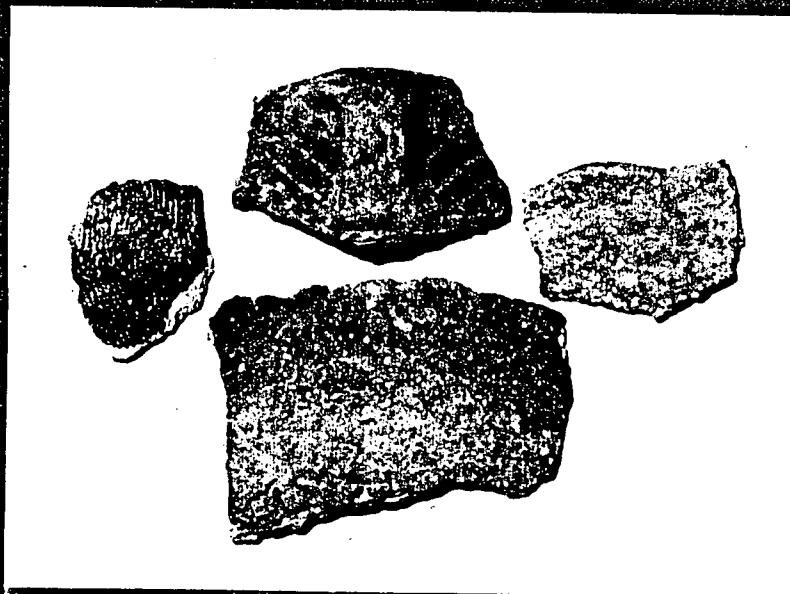
000105



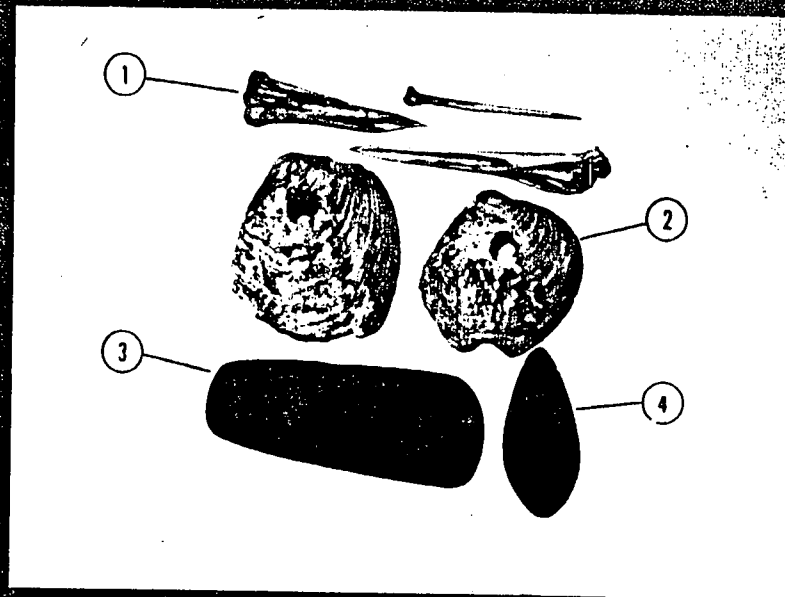
Three Cultures are Represented in the Above  
Projectiles: *Paleo, Archaic & Adena.*



Three Cultures are Represented in the Above  
Projectiles: *Archaic, Hopewellian & Fort Ancient.*



*Fort Ancient (Schomaker Phase).*



Tools & Their Representative Cultures:  
(1) Awls-Fort Ancient, (2) Shell Hoes-Fort Ancient,  
(3) Square Celt-Hopewell, (4) Plummet-Not Identified.





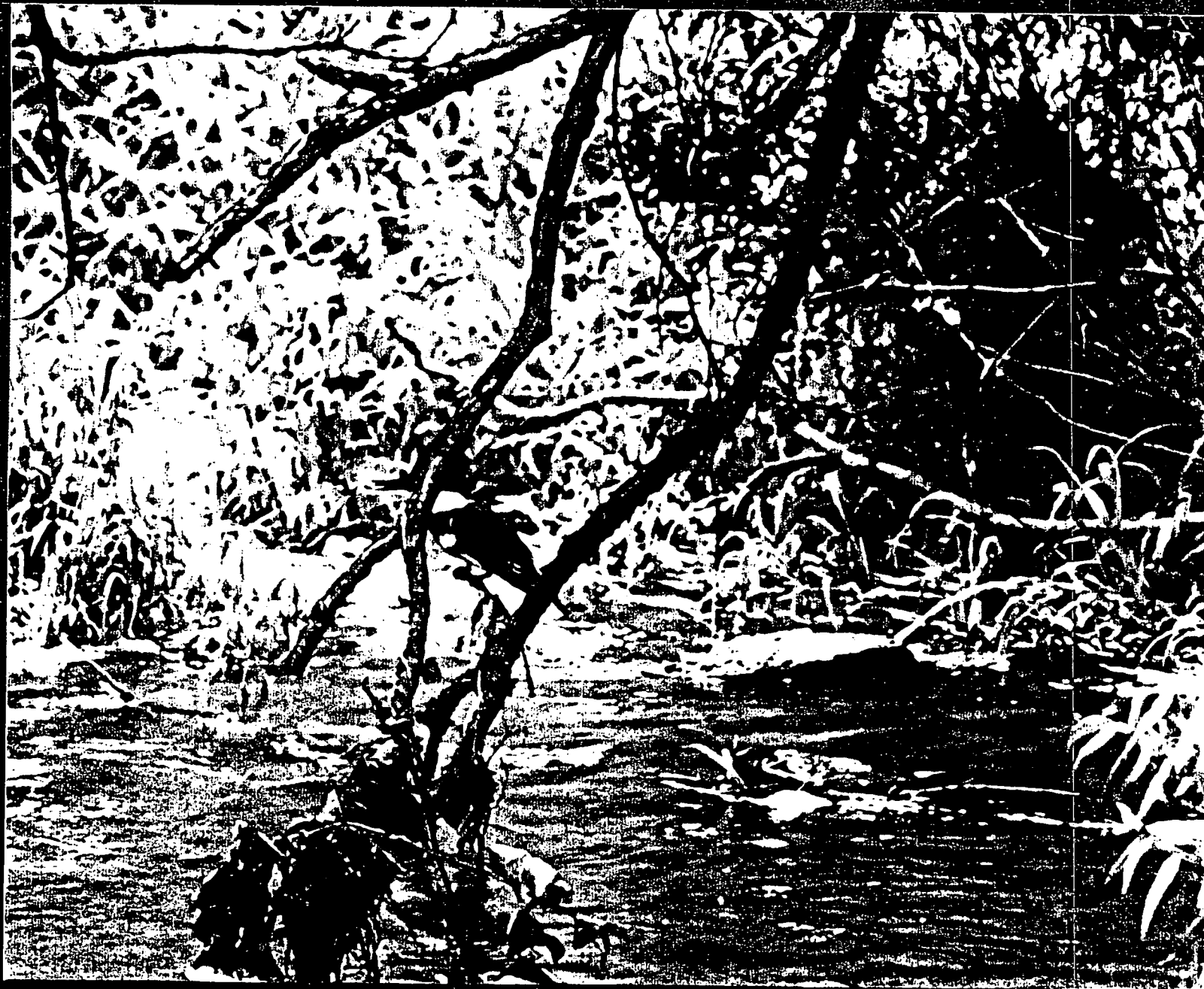
100-Year and 500-Year Floodplain Beyond FEMP Boundaries (Great Miami River).

6364

000107



000108



100-Year and 500-Year Floodplain on the FEMP (Paddys Run).  
Notice the Belted Kingfisher (*Megaceryle alcyon*) on Branch.

6364